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Twenty-third Annual Report

OF THE

Chief State Factory Inspector

OF

Illinois

OSCAR F. NELSON, Chief



For the Year July 1, 1915, to June 30, 1916



SPRINGFIELD, ILL.
ILLINOIS STATE JOURNAL CO., STATE PRINTERS.
1913

LETTER OF TRANSMITTAL.

ILLINOIS DEPARTMENT OF FACTORY INSPECTION,
1543 Transportation Building, 608 South Dearborn Street,
CHICAGO, ILL., *June 30, 1916.*

His Excellency, Hon. Edward F. Dunne, Governor of Illinois.

DEAR SIR: In compliance with section 2 of the act creating this department, I have the honor of submitting herewith the twenty-third annual report for the fiscal year ending June 30, 1916.

Very respectfully yours,

OSCAR F. NELSON,
Chief State Factory Inspector.

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REPORT OF THE CHIEF STATE FACTORY INSPECTOR.

Not the least important part of the duties of my office is that which requires me to submit an annual report on the activities of this department, in the enforcement of the ten distinct State statutes delegated to it as its work.

I am fully conscious of the responsibility incurred in placing before your Excellency and the people of this great State, the record of the conditions and events connected with such an important subject as the welfare of the workers engaged in earning a livelihood in the stores, mills, factories, and workshops of Illinois.

As these reports are now being sought for so generally among employers, wage-earners, and an ever-increasing number of persons who take an interest in the subject of working conditions, the utmost care is necessary in its preparation, and your Excellency will, of course, realize that it is an utter impossibility in a report of this kind to even remotely touch upon all of the angles and the many matters which continually come under the notice of this department during a period of twelve months.

Under the different headings which follow, an effort is made to present the most important phases of the work in such a manner as to furnish real information to those most directly interested.

When the General Assembly created this department its only duty involved the care of minors under 16 years of age. Those under 14 years of age were prohibited from all employments then, as now. Those between the ages of 14 and 16 were permitted to work on the condition that they could read at sight and write legibly simple sentences, which legal requirement is the same today. During the 23 years of the department's existence, 9 additional new laws were enacted and charged to us for enforcement. Many of them entail considerable more technique and work to enforce than does the "Child Labor Law." The following brief mention of those nine State statutes should be sufficient to impress any thoughtful person with the fact that the Factory Inspection Department is today a mighty important unit in the administration of the State's affairs, in that it not only deals with the conservation of the future citizen, the child of today, but it is also the legal conservator of the health, life and limb of men and women who labor throughout the State.

The "Garment Law," commonly known as the "Sweatshop Act," makes it the duty of the department to demand from all employers who send work to home workshops that they furnish a list of the same, and to inspect these workshops to ascertain whether such work performed at home is done under sanitary conditions and only by members of the family, the purpose of the act being to prevent contamination of goods upon which work is being performed, by reason of insanitary conditions.

The act known as the "Blower Law," which provides for adequate suction system equipped with proper hoods to remove all dusts and

grindings on metal polishing and grinding machinery, operates directly to the conservation of health of men engaged in occupations where metal polishing, buffing and grinding are done. This class of workers, previous to the enactment of the law, showed a suprisingly high rate of morbidity, due to tuberculosis. The records of the sick benefit organizations in local trade unions show a decided decrease in sickness and morbidity since the enactment and strict enforcement of this law.

The law known as the "Structural Safety Law," which provides for safety in and about the construction, repair and alteration of buildings, bridges, viaducts, etc., imposes upon the department the duty of inspecting construction work, ordering safeguards to protect life and limb of the workers in the building trades industry.

The "Health, Safety and Comfort Law" is, as its name designates, strictly a humane, conservation measure, because, by its provision safeguards attached to machinery mean less accidents, and that means less interruption of the earning power of the worker.

The law also provides for proper ventilating of work places, proper toilet facilities, proper fire-escapes, and in fact vests the department with authority to order the correction of any condition dangerous to the health, safety and comfort of the worker.

The "Women's Ten Hour Law" is designated to protect the women in industry, conserving her health by restricting her hours of labor per day.

The "Occupational Disease Law," in substance, provides that extraordinary precautions must be taken to safeguard the health of those workers engaged in industries where disease common to the industry or occupation might develop.

The so-called "Ice Cream and Butterine Act" makes it the duty of the department to inspect places where such commodities are manufactured, and to see that surrounding conditions are sanitary and not likely to contaminate the product.

The "Wash House Law," effective July 1, 1913, is another health conservation measure in that it provides for adequate sanitary washing facilities, consisting of hot and cold water, for the use of employees engaged in occupations where they become covered with grease, dust, grime and perspiration, etc. This measure not only conserves the health of the workers, but adds to the general public comfort in the fact that it eliminates the offensive condition in which workers were formerly required to return from work, coming in contact with the general public on the street-cars, etc.

The most recent health conservation measure is the so-called "Basement Law," enacted by the last General Assembly, effective July 1, 1915, which prohibits the operation of plating and grinding shops in rooms lying below the ground; in other words, in basements.

The above are, in substance, the provisions of the statutes that at the present time make up the factory laws of this State.

This report of the results of inspections according to the laws that come under our department for enforcement, comprise the twelve-month period from July 1, 1915, to June 30, 1916, and constitutes the twenty-third annual report of the department, it having been created in 1893.

During the past year the inspection work has been carried on in the same degree of endeavor to accomplish real results as has marked the result of inspections during the preceding two years. The text and statistical tables which follow will bear out this statement. Briefly summarized our records show this department has increased such inspections over the previous years. The principal item at present is that 64,998 establishments were visited by deputy state factory inspectors, who made 76,593 inspections in these employments, for the observance of all the laws that come within our jurisdiction. These figures show a slight gain when compared with those of the year before. During the preceding year, 56,068 establishments were visited, in which 69,099 inspections have been made. Thus, the number of business establishments visited exceeds the previous year by 8,784.

In this connection, it must be mentioned that with the addition of each law, a variety of inspections increases and more time of the inspectors in the usual performance of their duties is consumed. New problems arise with the enactment of every new law. New methods of inspection must be devised and, in general, new responsibilities devolve upon the shoulders of the factory inspectors.

To give the reader a concise picture of the amount of work done during the past year a summary follows showing the number of industrial establishments visited by inspectors and the number of inspections made according to the various laws under the jurisdiction of this department:

SUMMARY OF INSPECTIONS.

July 1, 1915 to June 30, 1916.

Laws enforced.	Number of establish- ments visited.	Number of in- spections.
Total for State	64,998	76,593
According to—		
Child Labor Law, entire State	32,703	37,147
Child Labor Law, in Cook County	21,190	24,406
Child Labor Law, outside Cook County	11,513	12,741
Women's Ten Hour Law, entire State	21,062	26,055
Women's Ten Hour Law, in Cook County	13,252	16,663
Women's Ten Hour Law, outside of Cook County.	7,809	9,392
Garment Law, entire State	1,630	2,522
Occupational Disease Law, entire State	146	146
Structural Law, entire State	553	1,054
Blower Law, entire State	339	1,104
Ice Cream Law, entire State	183	183
Wash House Law, entire State	391	391
Basement Law, entire State	14	14
Health, Safety and Comfort Law, entire State	7,977	7,977
Health, Safety and Comfort Law, in Cook County..	4,230	4,230
Health, Safety and Comfort Law, outside Cook County	3,747	3,747

The following tabulation presents the number of employees in establishments visited, classified according to the particular law under which they were inspected:

**NUMBER OF EMPLOYEES REPORTED IN ESTABLISHMENTS
INSPECTED ACCORDING TO THE VARIOUS LAWS.**

Year July 1, 1915, to June 30, 1916.

ESTABLISHMENTS INSPECTED ACCORDING TO CHILD LABOR LAW.

Employees in Chicago—

Number of males over 16 years of age	261,175
Number of females over 16 years of age	98,212
Number of males under 16 years of age	2,458
Number of females under 16 years of age	2,601

Total number of employees in Chicago	<u>364,446</u>
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Employees Outside of Chicago—

Number of males over 16 years of age	139,576
Number of females over 16 years of age	38,051
Number of males under 16 years of age	828
Number of females under 16 years of age	579

Total number of employees outside of Chicago	<u>179,034</u>
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Employees in State of Illinois—

Number of males over 16 years of age	400,751
Number of females over 16 years of age	136,263
Number of males under 16 years of age	3,286
Number of females under 16 years of age	3,180

Total number of employees in State of Illinois	<u>543,480</u>
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ESTABLISHMENTS INSPECTED ACCORDING TO THE WOMEN'S TEN HOUR LAW.

Employees in Chicago—

Number of males over 16 years of age.....	269,157
Number of females over 16 years of age.....	129,318

Total number of employees in Chicago	<u>398,475</u>
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Employees Outside of Chicago—

Number of males over 16 years of age	137,510
Number of females over 16 years of age	48,458

Total number of employees outside of Chicago	<u>185,968</u>
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Employees in State of Illinois—

Number of males over 16 years of age	406,667
Number of females over 16 years of age	177,776

Total number of employees in State of Illinois	<u>584,443</u>
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ESTABLISHMENTS INSPECTED ACCORDING TO HEALTH, SAFETY AND COMFORT LAW.

Employees in Chicago—

Number of males over 16 years of age	74,654
Number of females over 16 years of age	17,844

Total number of employees in Chicago	<u>92,498</u>
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Employees Outside of Chicago—

Number of males over 16 years of age	68,603
Number of females over 16 years of age	10,104

Total number of employees outside of Chicago	<u>78,707</u>
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Employees in State of Illinois—

Number of males over 16 years of age	143,257
Number of females over 16 years of age	27,948

Total number of employees in State of Illinois 171,205

ESTABLISHMENTS INSPECTED ACCORDING TO GARMENT LAW.

Employees in Chicago—

Number of males over 16 years of age	23,088
Number of females over 16 years of age	29,331
Number of males under 16 years of age	325
Number of females under 16 years of age	778

Total number of employees in Chicago 53,522

Employees Outside of Chicago—

Number of males over 16 years of age	960
Number of females over 16 years of age	1,778
Number of males under 16 years of age	9
Number of females under 16 years of age	49

Total number of employees outside of Chicago 2,796

Employees in State of Illinois—

Number of males over 16 years of age	24,048
Number of females over 16 years of age	31,109
Number of males under 16 years of age	334
Number of females under 16 years of age	1,112

Total number of employees in State of Illinois 56,318

ESTABLISHMENTS INSPECTED ACCORDING TO BLOWER LAW.

Employees in Chicago—

Number of males over 16 years of age	2,028
Number of females over 16 years of age	20

Total number of employees in Chicago 2,048

Employees Outside of Chicago—

Number of males over 16 years of age	1,058
Number of females over 16 years of age	16

Total number of employees outside of Chicago 1,074

Employees in State of Illinois—

Number of males over 16 years of age	3,086
Number of females over 16 years of age	36

Total number of employees in State of Illinois 3,122

ESTABLISHMENTS INSPECTED ACCORDING TO STRUCTURAL LAW.

Employees in Chicago—

Number of males over 16 years of age	14,524
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Total number of employees in Chicago 14,524

Employees Outside of Chicago—

Number of males over 16 years of age	5,066
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Total number of employees outside of Chicago 5,066

Employees in State of Illinois—

Number of males over 16 years of age 19,590

Total number of employees in State of Illinois 19,590

ESTABLISHMENTS INSPECTED ACCORDING TO WASH HOUSE LAW.

Employees in Chicago—

Total number of males over 16 years of age 31,420

Employees Outside of Chicago—

Total number of males over 16 years of age 20,554

Employees in State of Illinois—

Total number of males over 16 years of age 51,974

The error must not be committed of assuming that the various totals under each law added together show the number of employees in this State, as many places visited were inspected under more than one law, according to the applicability of the various laws to the particular place of employment. Our records do not attempt to form a census.

THE PRESENT ADMINISTRATION OF THIS OFFICE COMPARED WITH PRECEDING ONE.

When your Excellency took over the affairs of the State you ordered a complete reorganization of the various State departments, with a view of getting greater efficiency. Your investigators reported the needs and changes required in this department and, accordingly, every new move was in the direction of more adequate service to the citizens of this commonwealth.

Now that the fiscal year of this department is closing for the third time under your administration, it is extremely fitting to review the work accomplished. In order to permit a better and more lasting picture of what has been actually done, the following table, which draws a comparison of the three years under your administration with the preceding three years, has been prepared. It shows the number of inspections made while visiting various stores, shops, and factories in the regular course of investigations for the purpose of tracing the true extent of the observance of the numerous provisions of the laws:

	From July 1, 1910, to June 30, 1913.	From July 1, 1913, to June 30, 1916.	Per cent of increase.
Inspections (all classes)—			
Child Labor.....	79,362	108,507	36.7+
Ten Hour.....	14,525	60,781	318.4+
Garment.....	6,189	8,575	36.9
Blower.....	1,144	3,704	223.8—
Structural.....	997	2,693	170
Occupational Disease.....	204	1,316	545
Health, Safety and Comfort.....	9,213	20,714	124.8
Ice Cream.....	576	2,019	250.5
Wash House.....			
Basement.....		14	
Number of inspectors.....	30	30	
Number of convictions.....	1,006	1,707	69.7
Amount of fines and costs.....	\$14,743,777	\$26,849 01	82.1

From the foregoing figures the beneficial effect attending the reorganization of this department may be seen readily.

It will be noticed that the number of inspectors was the same during the time from which the tables are drawn, but that the number of laws under which inspections of factories and workshops were required had increased by two. The addition of these two new laws necessitated new efforts on the part of the inspection force and took part of their time, which formerly was devoted exclusively to the eight laws enforced by the department.

Comparing the two grand totals discloses the fact that more than twice as many inspections were made during the three-year period ended June 30, 1916, than during the preceding three years.

Reviewing the variety of inspections required according to the different laws enumerated further shows that in each instance many more inspections were made. None of the classes show a decrease. Thus the number of inspections made while enforcing the provisions of the Child Labor Law increased 36.7 per cent; while enforcing the Women's Ten Hour Law, 318.4 per cent; while enforcing the provisions of the Garment Law, 36.9 per cent; while enforcing the Structural Law, 170 per cent; while enforcing the provisions of the Occupational Disease Law, 545 per cent; while enforcing the provisions of the Health, Safety and Comfort Law, 124.8 per cent; and while enforcing the provisions of the Ice Cream and Butterine Law, 250.5 per cent; and while enforcing the provisions of the Blower Law, 223.8 per cent.

No comparison can be made of the work under the Wash House Law and the Basement Law, as both of these became effective after June 30, 1913.

Not only is the higher degree of efficiency evidenced by the greater number of inspections made and the increased number of prosecutions, but the real efficiency must be determined by the results obtained in the actual improvement of working conditions for the millions of wage-earners in the State. The real beneficial effect resulting from the reorganization of this department was to bring about a respect for the department, its representatives and its orders issued in conformity with the law. Three years ago, upon taking hold of the department, I found in its files that orders had been issued during the preceding three years for safeguarding of dangerous machinery, changes in ventilation, toilet facilities, and other things required by the law, but that no attempt had been made to reinspect, and therefore, some of the employers apparently had gained the impression of the Department of Factory Inspection that its orders were not to be taken seriously, because there seemed to be an impression no steps were ever taken to bring about the enforcement of such orders. Our policy has not been to see how many employers we could drag into court and how much fines we could have imposed; but to bring about compliance with the law. Some prosecutions have been necessary and those have been beneficial in the fact that the old impression that the department orders need not be taken seriously has been supplanted by the impression that the Illinois Department of Factory Inspection is sincere and thorough in its work of enforcing the law on the basis of reason and common sense.

I believe, in fact, I invite contradiction, when I make the statement, that there is not an employer in the State of Illinois who can honestly deny that this department has been reasonable and fair in the enforcement of the provisions of the law. We have on file in our office many letters commending the department on the fact that no partiality has been shown, and for the valuable safety-first suggestions made by the deputy inspectors.

Personally, my opinion is that within a short time, with the co-operation that has been developed between the employers of this department, very few prosecutions will be necessary, because of the increasing respect that is being shown the department and its representatives.

During the past three years prosecutions resulted in 1,707 convictions, making an increase of 69.7 per cent. During the present administration there were turned over to the public school fund in fines, \$26,-849.01; for the preceding three-year period, \$14,743.77; resulting from 1,006 convictions.

This concludes a brief comparison of the work of this department and the results in the matter of enforcing the laws.

We now come to another matter of interest to the general public—that of the cost of the operation of this department. The following table shows the amounts appropriated and expended in maintaining this department for the three-year period under your administration and for the three-year period preceding your administration:

Item of expense.	July 1, 1910, to June 30, 1913.	July 1, 1913, to June 30, 1916.
Statutory positions	\$133,000 00	\$131,900 00
Graded positions appropriated for	23,400 00	40,060 00
Rent and light	8,000 00	15,000 00
Traveling expenses	60,000 00	48,500 00
General and contingent expenses	75,000 00	26,800 00
Emergency fund		3,453 00
Total	\$299,400 00	\$265,713 00

The above figures show that the department, with its increased accomplishments, has cost the taxpayers \$33,687 less than it did during the preceding three years. In pointing out the cost of maintaining the department, I wish to emphasize the fact that through reorganization methods suggested by you, we have had increased accomplishments, even though the appropriations have been smaller. The appropriations, as the general public are well aware, are made by the Legislature.

FINANCIAL REPORT OF THE DEPARTMENT.

Appropriations and expenditures for the year ended June 30, 1916.

APPROPRIATIONS.

SALARIES—

Statutory officials—

Chief	\$ 3,000 00
Assistant chief	2,250 00
Physician	1,500 00
Attorney*	625 00
Thirty deputy inspectors at \$1,200 each per annum.....	36,000 00

* Appointed by Attorney General.

SALARIES—Concluded.

<i>Graded positions—</i>	
Clerks, stenographers, special investigations, etc.....	\$25,740 00
Traveling expenses for deputy inspectors.....	16,000 00
OFFICE AND GENERAL EXPENSES—	
Rent and light	5,000 00
Printing, postage, telephone, office supplies.....	6,800 00
Contingent fund	1,000 00
Deficiency appropriation	2,453 00

EXPENDITURES.**SALARIES—**

<i>Statutory officials—</i>	
Chief	\$ 3,000 00
Assistant chief	2,250 00
Physician	1,500 00
Attorney	625 00
Thirty deputy inspectors at \$1,200 each per annum.....	36,000 00
<i>Graded positions—</i>	
Clerks, stenographers	25,740 00
Traveling expenses	16,000 00
OFFICE AND GENERAL EXPENSES—	
Rent and light	5,000 00
Printing, postage, telephone, office supplies.....	6,800 00
Contingent fund	1,000 00
Deficiency appropriation	2,453 00

CHILD LABOR.

The experience of our department and of the enforcing agencies of other leading manufacturing states has shown the necessity of broader and more thorough child labor laws than are in force at the present time. While each of the previous reports has remarked the decrease of child labor resulting from the laws of 1891 and 1903, they also repeatedly point out the weakness of the present method of regulating child labor.

The law aims at two things: the prohibition of employment of children under 14 years of age in nearly all occupations, and the regulation of conditions and hours of labor of children between 14 and 16 years of age. In the first instance, the law has been of partial success, and in the second considerably a failure. In my last annual report I recommended and urged the enactment of a new Child Labor Law drafted by the Illinois Child Labor Committee, of which I was a member. That bill was introduced in the Legislature, but failed of enactment. The proposed law provided in substance that no child should be employed under the age of 16 except during the vacation period. My reasons for the recommendation then (which I desire to repeat at this time) are as follows:

First, that industrial conditions have been practically revolutionized in the past 15 or 20 years, with the result that today the industrial and commercial world affords no employment for children under 16 years of age whereby they may prepare themselves, through experience gained in such employment, for future livelihood. Industry has become so highly specialized that the only employments afforded children under 16 years of age are what may truthfully be termed "blind alley" occupations. By that I mean occupations that lead to

nowhere. Occupations that afford no opportunity to a child to acquire experience that may be used to earn a livelihood in future years.

In the main, such employments consist of performing some monotonous duty, such as packing crackers, soap, lifting or carrying articles from a machine to a table, or vice versa, labeling or pasting, or other similar work that requires no mental effort and therefore affords no mental development in the child, and it is usually work that stunts the child physically due to the fact that the child must sit or stand in a certain position throughout the day, using only certain muscles. When the child becomes 16, 17 or 18 years of age and it is necessary that it demand increased compensation, it usually means hunt a new job, as the employer with his efficiency and cost-system has such work rated at a certain compensation and will not pay more. Thus, the child who has spent the years between 14 and 17 in such employments is turned loose on the community, absolutely devoid of any experience that he can market. He or she is not as mentally or as physically active as the normal person of 16 or 17 years of age who has not been shut up in a factory or office during those three years when nature should have developed them both mentally and physically.

I have met the individual who argues that certain successful business men of today began to work at a tender age. They attempt to leave impressions that it was the fact that they went to work at a tender age that made them a success, therefore, they advocate the abolition of the restrictions of child labor in order, according to their logic, that children may grow up to be successful manufacturers and business men by going to work at 10, 12, or 13 years of age. The only reply that is in order to persons who use such argument is, that they overlook the fact that 25 years ago the average employer had no more employees in his business than he was personally acquainted with, and usually the employer worked with and alongside of his employees. There existed then an opportunity for a boy 13 or 14 years of age to find employment that would give him experience that would stand him in good stead in earning his livelihood in the future, an employment that afforded both mental and physical development.

Also, at that time we did not have our congested cities and towns, and the young boy employed had some opportunity after the day's work, and on holidays, to get some real recreation of a kind that made for physical development.

Another of my many reasons for sincerely urging further restrictions of child labor, in addition to the one already mentioned regarding occupations that lead to nowhere, is the fact that today a good many of the employers of labor in this State and throughout the country are requiring every applicant for a job (man or woman) to undergo a thorough medical examination in order that the employer may hire none but those who are physically perfect, or at least measure up to a high standard of physical perfection. More and more the employers are taking up this practice and I predict that within a very few years almost every employer in the State will have adopted this method.

What does this mean, and how does it affect the child labor question? My answer is that it means simply that the child worker of today who, by reason of employment during his immature years, is

stunted physically and in many instances mentally, will find himself rejected on the labor market when he reaches adult age, because of his inability to pass the medical examinations required of employees as necessary to a job. This is a fact that the State, as the body politic, must take into consideration, as the State must in every instance, either directly or indirectly, care for dependents. My suggestion is that the State face the situation today and face it in the most economical, practical and humane manner, by *prohibiting child labor under the age of 16 years, no matter what the expense in dollars and cents might be.*

REAL PREPAREDNESS.

As recently as July 5, 1916, at the convention of the National Educational Association, which comprises teachers, superintendents of schools, professors, and in fact the educators of our nation, Hon. Philander P. Claxton, U. S. Commissioner of Education, very forcefully pointed out the need for action that would conserve the physical condition of American men and women.

He said, "I was told by a recruiting officer for the United States Marine Corp, that 41,000 men were examined in order to obtain 4,000 recruits. At that rate, with 21,000,000 men in the United States, we would have only 2,000,000 for defense."

It goes without saying that if a man is not physically fitted to enter the United States Marine Corp, he is not physically fit to compete in the struggle for a livelihood in the industrial world today. It must also be realized that men who offer themselves for enlistment in the Marine Corp come from the working class, the majority of whom constitute the child labor of 10, 12 and 15 years ago, so that it cannot be questioned that the ill effects and the extreme cost, from an economical standpoint, of child labor is very forcefully demonstrated in the fact that of 41,000 men examined for the Marine Corp, 37,000 of them were rejects.

In suggesting the prohibition of child labor under 16 years of age, I am cognizant of the argument that is advanced as to "what are the widows and families to do who are today dependent upon the meagre earnings of their children to assist them in maintaining the home"? I shall endeavor here to answer that argument, but before doing so let me briefly discuss what, in my opinion, is the cause of child labor. First of all, one of the common causes of child labor is the situation widows find themselves in, and mothers whose husbands are incapacitated by reason of sickness or industrial accident. Another cause of child labor is the fact that a great number of our adult male wage-earners, heads of large families, are receiving wages entirely inadequate for the support and maintenance of their families as befits American citizens. *At this particular time when the entire country is discussing preparedness, it is not amiss to point out that the very foundation on which preparedness must rest, whether it be preparedness to meet the mental and physical demand that is made upon citizens for the conduct of their government in times of peace or in war, is the conservation of the child.*

There is no dodging the fact that the father, the head of a home, with a growing family of four, five or six children, who is only earning \$2.50 or \$3 per day, cannot provide and care for and educate that

family in accord with American ideals. The result is, the minute the child reaches an age where it might be useful as a revenue producer, the father is compelled by actual necessity to send the child into the labor market.

Another of the causes of child labor is the fact that within our State are thousands of emigrants who have colonized in the industrial centers and because of such colonization they do not assimilate American ideals very quickly. They are, as a rule, the poorest of the financial poor of Europe. They were themselves undoubtedly compelled to go to work in the fields for the large landed estates in their native country at a tender age. Since their arrival in this country, and becoming employees of large industrial concerns, they have had no opportunity to give thought to the fact that their boy and girl cannot grow to manhood or womanhood in decent physical condition if they are sent into the factory and workshop at an immature age. They fail to realize the difference between a child working out in the open fields and the child employed within four walls, and, therefore, a good many of the newly arrived foreigners who have learned nothing of American ideals feel that it is quite proper and in accord with customs and traditions as they know them, to send their son and daughter to work, just as soon as they are able to perform any labor. In quite a few cases that have come to the department's attention, it was not absolutely necessary from a financial standpoint, that these foreigners send their children to work.

To sum up, there are three causes of child labor: first, widows and mothers whose husbands are incapacitated to work; second, low wages; third, those who send their children to work because of ignorance and greed.

To return to the argument as to what the State can do to take care of the situation in cases of widows and women whose husbands are incapacitated and must send their children out to help support the family, I desire to direct attention to the fact that we have on the statute books of Illinois an act known as the "Mothers' Pension Act." In substance, it provides that widows and mothers whose husbands are incapacitated for work by reason of mental or physical infirmity, may receive at the direction of court, a pension of \$15 for one child, and not more than \$10 for each additional child under 14 years of age, not to exceed the sum of \$60 per month to any one mother. The law further provides that whenever any child shall arrive at the age of 14 years, any relief granted to the mother for such child shall cease, provided that if the child of 14 years of age is ill or incapacitated for work, relief shall continue for the care of such child during such illness or until he or she reaches the age of 16.

My recommendation is that the Legislature amend the Mothers' Pension Law so that instead of compelling child labor at the tender age of 14 years, pension shall be provided until the child is 16 years of age, permitting the child to continue in school, and have the opportunity of two years' additional schooling and physical development. If such amendment is made, that will care for the widows and mothers whose husbands are incapacitated.

I admit that a solution for the cases of child labor where the husband is alive and working, but is receiving a wage that is inadequate

for the support of his family, is a difficult one; but my suggestion and recommendation is that the Legislature enact a law that will grant such parent, who, through no fault of his own, but by reason of low wages is unable to keep his children in school until they reach 16 years of age, financial support sufficient to enable him to continue his children in school until they are 16 years of age. I maintain that the State should take such action as a duty it owes to itself for the preservation of the State and all of those ideals for which the State as a unit and our American nation stand. I maintain that such action is the first principle of preparedness for the future welfare of the State and that it is the most economical action from a dollar and cent standpoint that the State can take. I contend that it would be more economical to pay out a sum of money to families to maintain their children at school and insure their mental and physical development than to maintain, at an enormous expense to the State, reformatories, penitentiaries, homes for feeble-minded, etc., because in the final analysis the necessity for maintaining these institutions can be traced back to the conditions imposed upon the children of the past.

POOR ATTENDANCE AT SCHOOL.

Investigation and reports show that only 7 per cent of the children who enter the public schools ever conclude a grammar education. Just about one-third of the children who enter the public schools ever finish the elementary grades, and not one-half of them finish the sixth grade. That means that about one-half of all of the children leave school before they have acquired sufficient knowledge with which to read a newspaper intelligently. In Chicago, 43 per cent of our children never reach the eighth grade. These facts regarding the education of our future American citizens have as yet attracted but very little of the attention of the general public, who are given to boasting about the ideals and opportunities that are ours under our American form of government, which is beyond question the best and most democratic government any people ever lived under. When the serious-minded and thoughtful element among our citizens comes to realize fully that in the development of our commercial and industrial life the conditions enumerated above regarding the few years of schooling the majority of children receive, then we will have action, and intelligent action, both as regards the child labor problem and the matter of vocational education.

No one has had a better opportunity than this department to come to a keen realization that because of the lines upon which industry has been developed within the past ten years, vocations are rapidly becoming a lost art through extreme specialization and subdivision of labor which has been carried to the extent that today workers are prevented from acquiring skill and training that would develop them. The result of specialization and subdivision of labor is monotonous and automatic employment, resulting in a less mentally and physically equipped worker. No man or woman who is confined daily for a period of 9 and 10 hours performing work that is monotonous and automatic can escape mental and physical stultification, and it requires no stretch of the imagination to realize that a child who has reached no stability of mind and whose physique is not developed, can even less withstand

the baneful effects that result from such conditions. I am not blaming employers for specialization and subdivision in their lines of business. It is but natural that anything that leads to better financial returns and increased output will be adopted by them; but I direct the attention of the people of this State to these conditions, because the effect of these conditions makes necessary such action as will insure a citizenship of mental and physical ability.

VOCATIONAL EDUCATION.

Among all the citizens who interest themselves in watching our educational system, there is unanimity of opinion that vocational education should be provided for by the State. In my recommendation that the child labor prohibition be raised to 16 years of age, I have in mind the fact that unless we prohibit child labor under 16 years, no matter what vocational education facilities might be provided in our public school system, but very few children would have an opportunity to take advantage of such an education. I maintain emphatically that as a companion measure to any vocational education law must come a Child Labor Law that will compel children to attend school until 16 years of age.

From my observations, I am satisfied that the only thing that has prevented vocational education has been difference of opinion as to the system or plan of vocational training. The difference being that some advocate a dual system of education; that is to say, that the vocational education should be separate and apart and under different jurisdiction from our present public school system; that the vocational training should be entirely separate from the academic training. Opposed to that plan are those who believe that vocational education should go hand in hand with the academic education, and the advocates of such unit system point out that the dual system which would take the child out of the academic course at 9, 10 or 11 years of age, place him in vocational training exclusively, is un-American and further is a system that would establish most effectively and rigidly class distinction in the coming generation. In other words, that the dual system would educate workmen's children to be working men and women all their lives and afford them no opportunity for a development of their natural ability, in that it curtails and deprives them of an academic education. On the other hand, the son and daughter of the citizen who had acquired wealth would continue in the academic schools and on to the college and the university.

The citizen who will permit his interest to lead him to investigate the difference that exists between the contenders for the dual and unit systems in connection with the vocational education question, cannot evade the conclusion that the dual system is inequitable and un-American. I am taking the liberty of appending hereto a statement by Prof. John Dewey of Columbia University in connection with this question:

"No question under discussion in education is so fraught with consequences for the future of democracy as the question of industrial education. Its right development will do more to make public education truly democratic than any other one agency now under consideration. Its wrong treatment will as surely accentuate all undemocratic tendencies in our present situation, by fostering and strengthening class divisions in school

and out. It is better to suffer for a while longer from the ills of our present lack of system till the truly democratic lines of advance become apparent, than to separate industrial education sharply from general education, and thereby use it to mark off in the interests of employers a separate class of laborers."

SUMMARY OF CHILD LABOR INSPECTIONS.

In the enforcement of the provisions of the Child Labor Law the same effective work which was recorded during the previous year continued, 37,147 inspections were made in 32,703 establishments located in the 102 counties of the State. Of this number 21,190 places of business were situated in Cook County and received 24,406 inspections. The remaining 11,513 business houses were located outside of Cook County, and received 12,741 inspections.

The net result of prosecutions for the entire State show 202 convictions for violations of the various provisions of the Child Labor Law. The fines and costs of these 202 convictions amounted to \$2,582.51 for the entire State.

Charged with employing children under 14 years of age resulted in the successful prosecution of 25 cases; in 57 instances convictions were secured for employing children over 8 hours per day; 23 convictions were obtained where the employer permitted the children to work before 7 a. m. or after 7 p. m.; for employing children without an age and school certificate, 84 prosecutions terminated in favor of the department. Section 11 of the Child Labor Law, which prohibits the employment of children under 16 years of age at or about dangerous machinery; 4 cases were convicted where children worked over 48 hours per week, and in 3 instances where the deputy inspectors were obstructed from entering a place of business for the purpose of inspection, the court ruled against the defendants.

In Chicago a total of 70 cases was brought before the judges of the Municipal Court and resulted in convictions, the fines being assessed at \$1,097.75. Convictions were secured on the following counts: for employing children under 14 years of age, 7; working children over 8 hours per day, 31; working children before 7 o'clock in the morning or after 7 o'clock in the evening, 6; hiring children without any age and school certificate from the board of education or parochial school authorities, 19; for permitting children to be employed more than 48 hours per week, 4; and for refusing admittance to the deputy factory inspectors and obstructing them in the performance of their duty, 3.

In cities other than Chicago, 132 cases were brought by the deputy inspectors, resulting in convictions with fines and costs amounting to \$1,484.76. The convictions just mentioned were secured upon the following counts: for employing children under 14 years of age, 18; for employing children between the ages of 14 and 16 years over 8 hours per day, 26; for permitting children 14 to 16 years of age to work before 7 o'clock in the morning or after 7 o'clock in the evening, 17; for hiring children without an age and school certificate from the board of education or parochial school authorities, 65; and for giving work to children under 16 years of age at or about dangerous machinery, 4.

In the city of Chicago all violations of the Child Labor Law are argued in the Municipal Court. The cases are prosecuted by an

Assistant Attorney General assigned to the department by the Attorney General. In other cities the cases are presented for prosecution either by the State's attorney or the deputy factory inspector before a justice of the peace.

Very few of the cases are heard by a jury. During the past year out of a total of 202 child labor cases only 4 demanded a jury. The reason for this circumstance is easily explained. An employer does not care to take a chance with a jury. So convinced is he that the average jury has the interest of the laboring classes rather than that of the employer at heart that he would rather place his fate in the hands of one man—a judge. The employer waives a jury trial for two reasons; first, on account of the fear of an adverse decision; secondly, on account of the heavier fine, which a jury imposes.

WOMEN'S TEN HOUR LAW.

Twenty-six thousand fifty-five inspections were made in 21,062 establishments located throughout the State during the fiscal year, which is covered by this report, for the purpose of enforcing the provisions of the Women's Ten Hour Law.

The records of this office show that 16,663 inspections of 13,252 establishments were made in Cook County, while in the 7,809 places of business in the other 101 counties 9,392 inspections were made.

On the whole not much trouble was realized in the enforcement of this law, when one stops to consider the number of establishments involved. Difficulty was had more with the keeping of time records of female employees, than with the restrictive feature of the law which limits the employment of females to 10 hours per day. Technicalities were invariably remedied after proper instructions and only such cases were prosecuted which betrayed gross negligence and evil intent upon the part of the employer.

Thus 223 cases were presented to the courts for hearings. This number represents all the cases filed in the entire State. The fines and costs of these cases amounted to \$3,561.10. There were two classes of charges; first, working women over 10 hours per day, of which 62 cases were convicted with fines and costs amounting to \$1,799.60; and second, for failure to keep a proper time record of the hours of employment, of which there were 161 convictions obtained with fines and costs amounting to \$1,761.25. In the Municipal Courts of Chicago a total of 106 cases were convicted with fines and costs amounting to \$1,896.55. Of this total number 37 convictions were based on violations of section 1 of the law, which prohibits the employment of women over 10 hours per day. The fines and costs in these cases amounted to \$1,027.50. For failure to keep a time record according to section 5 of the law 69 cases were prosecuted and convictions secured with fines amounting to \$869.05. In the other cities in the State 117 convictions obtained with fine and costs aggregating \$3,561.10. In these cities 25 cases were heard on account of working women over the legal limit of 10 hours and the fines assessed by the court amounted to \$772.10. On account of non-compliance with section 5 of the law demanding the keeping of a time record 92 cases were placed before the courts and 92 convictions secured, the fines and costs of which amounted to \$892.45.

The present law has been in operation seven years, but was amended five years ago in order to add the time keeping feature. It might be generally stated that the provisions of this law have become known to most employers of female labor. This is absolutely true of employers, such as restaurant keepers, proprietors of laundries, five and ten cent stores, department stores, confectioneries, paper boxes, retail dry goods, telegraph and telephone offices, and clothing shops.

But not only are employers familiar with the provisions of this law, but the women have become acquainted with it also and have instructed their coworkers. We find this particularly true of the women in restaurants, hotels, laundries, factories, etc. In these various occupations the women are mostly of a foreign nationality. The foreigners have been supplied with copies of the law in their native language and in that manner have learned its provisions.

Whatever we might say of the better compliance with the "Women's Ten Hour Law" has relatively little value, for the law as it stands does not afford the women the proper and adequate relief, which they need. Reflecting on the long stretch of hours which is legalized by our Women's Ten Hour Law, we find that not only are women working on the average a greater number of hours than are the men employees in our State, but in the majority of cases this 10 hour work day is so divided by working two or three hours, off an hour or two, back to work for two or three hours, off again for a very limited period, that in many instances the 10 hour day for women covers a period extending to 17 hours. In a city the size of Chicago, and in some of the other cities in the State, such as Springfield, Peoria, Decatur, East St. Louis, etc., women employees get no real value from these periods of an hour and a half or two hours that they are excused from duty, due to the fact that they live some distance from their place of employment and as in cases of restaurants and retail stores the period off duty is usually spent in and about the place of employment.

The United States Congress after committee hearings, formulated a bill and enacted the same into law, which restricts the hours of labor of postoffice clerks and carriers to eight per day and provides that such eight hours of labor must be worked within a period of ten consecutive hours. That is to say, if a lettercarrier or postoffice clerk goes on duty at seven in the morning, he must have his eight hours of duty performed before five o'clock in the afternoon, with two hours off. In the case of a large hotel in Chicago, girls reported at 5.45 a. m. in the morning and finished their day's work at 12.45 a. m. With time off during the day, an hour and two hours at a time, they kept their total number of hours actually worked within the ten hour limit. This schedule of hours was followed every day of the month with the exception of one Sunday a month off. The Ten Hour Law was not being violated in this case because under its provisions that schedule of hours was permissible. Surely, one employed at laborious work necessary in connection with the restaurant and hotel business, as well as in mercantile establishments, needs every bit as much protection as the United States Congress has seen proper and fit to give to its faithful servants in the postal service. Not only, as I stated above, are the postal employees' hours limited to eight per day and must be worked within a ten con-

secutive hour period, but they have a further restriction of one day off per week contained in the Federal law.

The restriction of hours of labor of women must of necessity come by legislation, not only because the State, as a whole, is interested in the future mothers of the race, but for the very practical reason that women wage-earners are not organized to any extent, and, therefore, not in a position to bring about a reduction of hours of labor through their own efforts.

At the Forty-ninth General Assembly an eight hour bill was introduced, which was later amended to nine hours, but failed of passage. Amendments to the present Women's Ten Hour Law will undoubtedly be presented to each session of the Legislature and efforts made until Illinois finally enacts a law that will average up at least with the other states in the Union, the majority of which have decidedly better restrictive legislation as regards hours of labor for women than we have today. Illinois ranks thirty-sixth in the list of those that have in force legislation of this character.

In urging the adoption of an eight hour day for women, the argument used before the United States Supreme Court in the *Bunting* case is worth repeating:

Since the time of the first factory acts in Great Britain, a new technique has established itself in the matter of industrial legislation—a new manner of approach and point of view. We have passed from the appeal of sentiment to the appeal of science.

The support of industrial legislation is no longer philanthropy and vague humanitarian aspirations; its bases are in the laboratory and the clinic; the bureau of labor statistics and the records of government investigation.

The universal movement is the advance of short-hour legislation throughout the world. In America we have limitation of hours in dangerous trades and in industries affecting the public, railroads and public utilities, for example; thirty states have the eight-hour law for public works, and on public contracts; some states have a limitation of men's hours in various private employments.

In foreign countries we see the same tendency at work in absolutely different and separate parts of the world. Within the last years, Norway, Switzerland, Portugal, Greece, Uruguay, Germany—even in war-time, in the hour of her supreme industrial need—have variously limited women's hours of work in industry, while the more progressive legislation of New Zealand has contained the eight-hour law for men and women since 1901.

A world-wide movement showing itself in nations so widely separated in position and character must clearly be dictated by some common experience. This common basis we find in the fact, increasingly recognized, that long hours tend to the detriment of those employed and therefore to the detriment of the State.

The insurance companies whose records show the appalling deterioration of the human physique in industry, the scientific investigators whose studies of occupational fatigue and occupational diseases have widened until they cover the whole industrial world, the increase of the unfit, shown in foreign recruiting statistics, all point to one end; the menace to national vitality inherent in modern industrial conditions.

We are face to face, then, with the evil—the common hazard of industry increased incalculably in recent years by the new strain of speed and monotony and the vitiating factors of environment, the hazard supposed so long to be peculiar to a few specific dangerous trades now seen at last as a common characteristic of all industrial life. This hazard is the common phenomenon fatigue, poisoning the system with its own waste products, lowering resistance to infection and nervous disorder, predisposing to disease in general.

What, then, is the remedy? There are two possible safeguards against exhaustion—a slackening in the pace of industry, or a reduction of hours. The first, possible in theory, is in the present trend of our industrial development wholly impracticable. The alternative is the introduction of the shorter day.

If the eight-hour day for men is necessary, how much more desirable is it for women, where the dangers of long hours arise from their special physical organization, especially when considering the strain incident to mercantile and factory work.

The shorter day has not diminished output; it has even in many cases increased it; it has not increased cost of production or even cost of labor; it has even diminished it. "The victory of shorter hours," said a French economist, writing of the famous Belgian experiment with the eight-hour day, is not based on deduction from abstract principles, but on the induction of men of affairs from observed facts of experience. Its human results are seen in improved management and stimulated invention, heightened energy and efficiency on the part of the workmen.

No more striking example exists of the demonstrated relation of fatigue to output and industry than the experience of England during the past two years. Nowhere has there been greater pressure, greater urgency to abandon the limitations upon hours of work.

Following are reports from three English women factory inspectors that substantiate very emphatically the contention that long hours of labor decreases efficiency and in reality decreases output. These reports are made in connection with the English factory inspector lifting the restriction of hours of labor of women in order to rush war supplies:

Miss Squire.—A well-known wholesale clothier employing 1,000 women on Government contracts gave it as his well-considered opinion that the full period allowed under the Factory Act, 8 a. m. to 8 p. m., is sufficient, and "any work beyond this is quite useless; it exhausts the workers and does not pay." Another employer of a thousand women pressed by the War Office to increase his output, refused firmly to work them overtime; all he asked for was to be allowed to keep the factory open seven days a week, employing Jewesses on the Sunday and the rest of the women on the Saturday.

Miss Constance Smith.—In the month of October, when applications for orders were general in London, the great Bristol clothiers were for the most part carrying out their contracts within the Factory Act day. Two firms only had emergency orders, and they were not using them to the full. Where overtime was worked at all, it was under section 49; but in several instances this had been tried and discontinued, the managers finding that an hour and a-half's overtime after 8 p. m. on three nights in the week had an injurious effect upon output, as well as upon health if carried on beyond a fortnight at the outside. In one case, where this bad effect showed itself at the end of the second week, the manager persuaded the directors to return, as an experiment, for a week to normal hours; the output and quality of the work improved so much during this week that the firm decided to keep to normal hours altogether. It would appear as if the question of carrying out contracts within the Factory Act day, if not within the normal clothier's day (some of the Bristol factories worked 9-7) were largely one of thorough organization and complete knowledge on the part of the managers of the rise or fall of output in each week, in proportion to hours worked and number of hands employed. Certain keen-sighted managers found their disapproval of overtime strengthened by the results of the short time worked in the early weeks of the war. One responsible for a factory employing over 2,000 women and girls, where the normal day is 7-6, told me that when this day had to be reduced to 8-5 by reason of cancelled orders, he found the girls' output remained the same.

Miss Taylor.—The outstanding feature was the refusal of the great majority of the occupiers of the largest and the better conducted factories in Leeds to entertain the idea of systematic overtime beyond the ordinary period of employment allowed by the Factory Act. Their reasons were, I gather, two fold. In the first place, overtime beyond the usual limits is

never financially beneficial for the output decreases relatively, while the standing charges for power, light, etc., remain the same. But the second and far more important reason was that the women were unable to stand any prolonged period of overtime employment. The supply of skilled labour is scarce in any circumstances, and it was generally felt that to overstrain the available labour was to the best interests neither of the trade nor of the country at the present time. With a few exceptions the demands of those firms who applied for an extension were moderate, and little difficulty was experienced in reducing the overtime to an extra two hours on three nights in the week, or its equivalent, for all women and young persons over 16 years of age.

And yet women should be better protected than men, not only because their physical strength is less, but because they are the bearers of the race, whose vigor is materially modified by the health of the mothers. The State has the deepest interest in maintaining vigorous and able defenders, and therefore, its foremost duty is to protect women and children from being overburdened.

THE PIECE WORK PAYMENT SYSTEM.

In our report of two years ago we took occasion to call attention to the dangers of work under the piece-payment plan, and at that time I suggested that this evil could be eradicated by proper legislation, because I am convinced that this circumstance comes within the police power of the State, and I made the statement then, "if the Legislature can regulate the hours during which women and children may be employed, then, reading between the lines of the opinion of the Supreme Court upholding the legality of that law, I say that the Legislature has the power to regulate their wage payment system by forbidding any employer to use the piece work or bonus payment system where women employees are engaged."

I wish to supplement my previous remarks by citing some authorities, particularly as to the dangers and ill effects of this system:

The system of piece work intensifies all the evils of speed and monotony in industrial establishments. A premium is put upon feverish activity, regardless of the physical cost to the worker when such worker aims to work faster for a slight increase in wages.

Senate Document 645 (61st Congress, 2d Session) a Report on Condition of Woman and Child Wage Earners in the United States, Volume III, enumerates four methods by which this system operates.

First—The establishment of a minimum output, below which the employees dare not fall for fear of discharge.

Second—The payment of higher price rates for increased production.

Third—A method very similar to that just cited, that of giving bonuses for all production above a certain standard.

Fourth—Standard set by a leader as a pacemaker.

The least of these methods is perhaps the most interesting says the report, "When an entirely new process is introduced or there is some one occupation, the output of which has fallen below normal, one of the most skilled and willing workers is made the "leader" of a group. She acts as a pacemaker and is urged to her best efforts to increase both her own production and that of her group by being paid 5 per cent more than the average of the entire group. In such a case the use of bonuses or graded piece rates is ordinarily added in order

to urge the individual workers to their highest speed. After this system has been in vogue for a short time, and the girls have become accustomed to working at their maximum efficiency, the 'leader' is removed, the bonuses discarded, and according to the testimony of many of the girls, the piece rate is cut to such a point that the average wage level is as it was when the employees were producing much less. By this means the production is said in several cases to have been doubled within a short time."

Speaking of the wearing-out effects, Dr. Fidolin Schuler,¹ Swiss Factory Inspector, writes: "The larger proportion of women in factories is certainly to be thought of in estimating the effects of the violent motion of the machinery on health * * *. But even more important is the over exertion * * * this is exhausting, especially when the practice of piece work spurs the women to greater exertion, and much more so when an overseer, warning and reprimanding the workers, urges them to the utmost degree of exertion."

And pointing out the anxiety of the weaker workers in the fear of falling behind in their output, Dr. P. Lenbuscher² writes: "Work has become very different. Piece work has developed an impetus and speed and intensity of effort that used to be unknown, and this materially crushes the weaker workers, those for whom all work is a heavier burden than for the strong. Continuous anxiety is felt by these, lest they fall behind. Then, sometimes voluntarily, sometimes compulsorily, overtime is undertaken, and so it turns out that the working hours, instead of being comparatively shorter than the usual day, are really much longer, and, by reason of the irregularity, far more exhausting."

That piece work is productive of industrial accidents is the view registered by Prof. G. Pieraccini and Dr. R. Maffie³ in the Italian Journal of Social Medicine, under the title, "days, seasons and hours when industrial accidents occur." "Piece Work," says these authorities, "necessitating higher speed, tends both in itself and together with the fatigue that ensues to favor the occurrence of labor accidents. We should see to it * * * that, above all, piece work should be condemned, preference being given to time work, the honesty of the worker and the consciousness of his own labor capacity regulating the speed of work."

The Factory Inspector⁴ for the Province of Ontario writes: "The system of piece work is becoming more generally adopted. The small pay given by the hundred or thousand, according to the different industries, stimulates the eagerness of the workers to the highest possible pitch. I have seen girls working so rapidly that I have asked myself the question, how long their nervous systems could resist the strain of the excessive fatigue resulting therefrom. A shorter working day for this class of operatives seems an imperative necessity."

Coinciding with the Senate Document, previously mentioned, the Commissioner of Labor⁵ of Minnesota writes in his annual report: "The

¹ Untersuchungen ueber die Gesundheitsverhaeltnisse der Fabrikbevoelkerung der der Schweiz-Aaran, Sauerlaender, 1899.

² Deutsche Medizinische Wochenschrift, Nr. 21, 25. Mai. Die Neurasthenie in Arbeitskreisen-Berlin, 1905.

³ Il Ramazzini. Giornale Italiano Di Medicina Sociale. Anno I, 10-11.—Le Stagioni, i giorni, le ore infortuni del lavoro. October-November, 1907.

⁴ Report of the Inspector of Factories for the Province of Ontario, Canada, 1898. Toronto, 1899.

⁵ Report of the Minnesota Bureau of Labor, Industries and Commerce. 1907-1908.

work that is done by women in so many departments of industry is 'piece work'—where the nervous strain is at its highest tension. When, by reason of skill or deftness, or a longer sustained energy, a girl is able to do a maximum amount of work, she is said to 'set the pace,' and she becomes a 'pacemaker' for the others. Those less skilled or less deft, or who for any reason are unable to keep up with the leader are striving with every nerve to earn as much as possible, and this great demand upon nervous energy entails a rapid decay of nervous force."

Referring to piece work by women in tanneries, the Report of the Wisconsin Bureau of Labor⁶ states: "Organized workmen usually object to the piece-work system. It so frequently leads to "speeding up," and the rate per piece is often cut down until only the fastest workmen are able to secure anything like a living wage. Those less skilled and less dexterous are thus made to suffer from the ambition or greed of a few involuntary pace-makers who work themselves out in a short time for the sake of temporarily earning higher wages.

"The girls have complained, too, of being cut when they began to earn high wages. This was substantiated by a superintendent, who remarked: 'Oh, if they get to earning too much they know what they will get,' contending that a general level of wages must be maintained. This would mean, then, that the average worker practically determined the amount one could earn, and any exertion beyond this only reached upon all in a general cut of the piece rate. Employers quite generally admit this situation. Men meet it by organization and attempting to regulate their employment by agreement with the employer.

"But, paradoxical as it may seem, stimulation to greater speed is frequently furnished in the opposite way. Another superintendent insisted that cutting the rate was the surest way to get more work done. He argued that when workers find their wages decreasing from a customary sum they naturally try to get back to the old standard by extra work. Thus they are caught between the upper and the nether millstones. The possibility of a cut is ever present. If they work unusually hard and earn higher wages, they face a cut in rates. If they do not turn out enough work to satisfy the superintendent, a cut is made anyhow to spur them on to higher exertions. They are annoyed and bewildered and uncommonly helpless."

Piece-workers seldom average more than week workers. Comparing the industrial life of both classes, the piece-workers earn less.

Piece-workers are seldom skilled trades people. They accept this system of wage-payment for lack of the other, and they are taught one trick of the trade and remain at that one monotonous grind to the point of a breakdown, and piece-workers while their health lasts are only human automatons—machines to be run until worked out or, replaced by a fresh one.

HEALTH, SAFETY AND COMFORT LAW.

The provisions of this law calls for the safeguarding of dangerous machinery, proper ventilation of workshops, elimination of dusts, proper exits, proper toilet facilities, seats for female employees, and in general

⁶ Report of the Wisconsin Bureau of Labor and Industrial Statistics. 1907-1908 Part VII. Women Workers in Milwaukee Tanneries.

vests this department with authority to issue orders to correct conditions where the health, safety and comfort of the employees might be jeopardized.

This law was originally enacted in 1909, effective January 1, 1910, and has been in constant operation since that time. At the last session of the Legislature, the Forty-ninth General Assembly, I took steps to have this statute re-enacted because in a suit under its provisions, it developed that some of the technicalities provided for by the Constitution in the enactment of laws had not been complied with, and while it was not believed that any court would hold it unconstitutional, it was deemed best to ask the General Assembly to re-enact it, which was done.

During the year just completed, 7,977 inspections were made in various factories, mills, mercantile establishments and workshops located throughout the State. Of this number 4,230 establishments were located in Chicago and Cook County, while the remaining 3,747 places of business were distributed throughout the remaining counties.

The results of inspections show that by reason of examination of the various plants and their machinery 32,342 orders were issued to correct defective and dangerous conditions pertaining to buildings, sanitation, power transmission, dangerous machines and dangerous machinery parts.

It is not without some little pride that this department is able to point to the large number of compliances, as follows: Out of a total of 32,342 orders issued during the past year, 37,514 upon reinspection and "check-up" were actually complied with.

Numerous articles on the methods of guarding dangerous machinery and giving protection to wage-earners in other respects will be found on pages 152-235. The subjects discussed are: Advantages of individual motor drive, belt joints, saw-dust as cheap and efficient fire extinguisher, safety museum, dust problem, accidents caused by fly-wheels and pulleys, punch presses, noises causing accidents, dangers of paper box machines, eye-protection, elevators, fire-escapes, new machines equipped with guards, belts, ropes and chains, electrical problem in shops, dangers in forge shops, guards, and conveyors and cranes.

On account of failure to comply with the orders issued by this department for the observance of certain safety features, it was necessary to institute prosecutions in 49 cases, all of which resulted in convictions, the fines and costs amounting to \$2,274. Of this total of 49 convictions for the entire State, 25 cases, whose fines and costs aggregated \$613.30, were successfully prosecuted in the city of Chicago, while in the other cities 24 convictions were obtained with fines and costs amounting to \$1,660.70.

INDUSTRIAL ACCIDENTS.

Only a small number of accidents are sent to this department, because the majority of employers having elected to abide by the provisions of the Workmen's Compensation Law now report accidents to the Industrial Board. Those employers who have not availed themselves of the advantages of the compensation law report accidents to this office.

The following table shows the number of accident reports received by this office during the fiscal year:

Number of accidents—			Cause of accidents—		
Fatal	63		Machinery	150	
Nonfatal	663		Other than machinery....	576	
Total	726		Time lost—days	14,040	
Injuries to.	Causes of acci- dents— Ma- chinery.	Causes of acci- dents— Other than ma- chinery.	Injuries to.	Causes of acci- dents— Ma- chinery.	Causes of acci- dents— Other than ma- chinery.
Head.			Legs—Concluded.		
Eyes	26	12	Toes	2	31
Face	2	15	Knees	1	16
Head	3	12	Thigh		6
Nose		1	Legs (frac- tures)	16	38
Total	31	40	Total	31	163
Arms.			Body.		
Fingers	45	102	Back	3	22
Hands	6	50	Chest and ribs.	8	10
Wrist	2	29	Shoulder	7	21
Arms (frac- tures)	12	28	Total	18	53
Total	65	209	Hernia.		
Legs.			Ruptures	5	2
Ankle		24	Grand total..	150	467
Feet	12	48			

This table shows that dangerous or defective machinery was the cause of 31 injuries to the head, 65 to the arms, 29 to the legs, 18 to the body, and that in 5 instances the operation of machines caused accidents resulting in ruptures.

Briefly stated the vast bulk of accidents are reportable to the Industrial Board and a very small number to this department. Section 24 of the "Health, Safety and Comfort Law" requires the reporting of such accidents only, which involve a loss of 15 consecutive days' time or more. There are undoubtedly numerous accidents which do not require the loss of that amount of time and it is safe to say, that if any injury does entail a loss of a half a month, it must be very serious. In other words, this law plainly disregards the large class of so-called "trivial" accidents, which in the light of present day accident prevention study are considered very important. Many accidents may cause the loss of only seven or ten consecutive days, but by returning to work with a prematurely healed wound serious complications or infections often set in resulting in the ultimate loss of weeks and months.

Every accident received by this department, no matter how seemingly insignificant, may become a valuable guide and index to the members of our inspection force in formulating means to overcome a repetition.

STATE INDUSTRIAL BOARD.

The State Industrial Board was created by the Forty-eighth General Assembly when the Workmen's Compensation Act of 1911 was revised and the enforcement of the provisions of that act were given

over to that board. In the entire history of all the State departments of our Government, there is none that can show a greater development or more real accomplishment and high-grade efficiency in the first three years of its existence, than the Industrial Board of Illinois in connection with the Workmen's Compensation Act.

Members of that board were given a gigantic task to accomplish when they were required to establish this new department, work out plans and procedure along legal form, that would normally congest courts of all the counties in this State. There is not an employer, employee or other person who has come in contact with this board during its existence but has been very forcibly impressed with the fact of the wonderful initiative, executive and real ability that have been effectively directed, with the result of great accomplishment.

The Industrial Board has cooperated with this department in many ways. Last year that board received from 5,670 employers, reports on 16,619 nonfatal accidents, and 125 fatal accidents, making a total of 16,744 cases disposed of during the calendar year 1915. The handling of that number of cases speaks for itself and makes further commendation absolutely unnecessary.

VENTILATION INSPECTIONS.

"The Health, Safety and Comfort Law" by virtue of section 11, requires that every factory, mill, mercantile establishment, and workshop be provided with proper and adequate ventilation.

When this department started ventilation investigations two years ago, it found that only nine workrooms out of 254 were complying with the law. It was pointed out at that time that over 23,000 persons working in these rooms were permitted to remain in stuffy, foul air during each working day of the year.

Their investigations have been continued during the past year, although the nature of the inspections assumed a somewhat different character. Two years ago these inspections were made to determine which shops required orders for adequate ventilation systems and the issuance of such orders. During the past year most of the work in connection with ventilation systems confined itself to checking up the systems, which had been ordered installed, to planning changes for greater efficiency and to taking velocity readings and measurements.

The requirements of the law are as follows:

Any workroom whose outside windows and doors measure one-eighth of the total floor area and having at least 2,000 cubic feet of air space for each person employed does not require artificial means of ventilation. Nevertheless, all such rooms must be aired before beginning work and during meal periods.

When a room contains more than 500 but less than 2,000 cubic feet of air space per person employed and the outside window and door area is at least one-eighth the floor area, then artificial means of ventilation must be provided, during the season of the year when the outside temperature requires windows closed, supplying during each working hour at least 1,500 cubic feet of fresh air for every person employed.

When a room has less than 500 cubic feet of air space per person, and the outside window and door space is less than one-eighth of the floor area, then artificial means of ventilation must be provided, which

will supply during each working hour throughout the year at least 1,800 cubic feet of fresh air for each person employed.

All injurious drafts must be avoided. The supply of fresh air must not cause the temperature to fall materially below the average temperature maintained.

The fresh air supply must be taken from the outside at least 20 feet above the ground. Air taken from the cellars or basements is absolutely prohibited.

Fresh air is admittedly the deadly foe of all disease. Provisions for fresh and pure air are to be found in theaters, in street cars, in halls and other places where people gather for only a short space of time; then why should not fresh air be supplied in abundance in workrooms, where persons remain long hours each day?

This department will enforce this section of the law with rigor. The department regrets that it is unable to cover the ground more rapidly. Here again the present small force of inspectors is a great hardship. Time is an important factor in making this class of inspection, as it requires two inspectors to take the measurements of a room often involving many long mathematical problems.

Results of special investigations for the introduction and improvement of ventilation systems in factories, mills and workshops, according to section 11, of the Health, Safety and Comfort Law, for the twelve months period, July 1, 1915, to June 30, 1916:

Number of establishments inspected in Chicago and Cook County.....	54
Number of workrooms inspected.....	75
Number of employees in workrooms.....	6,238
Number of orders issued to provide—	
1,500 cubic feet of air	47
1,800 cubic feet of air	28

WASH HOUSE LAW.

When the Forty-eighth General Assembly enacted this law it gave ear to the plea of personal cleanliness in the industrial world.

In such employments where workmen become covered with grease, smoke, dust, grime and perspiration to such an extent that their unclean condition at the end of a day's labor endangers their health or causes the public annoyance, it demands the installation of adequate washing facilities.

By adequate washing facilities is meant ample means in all respects for the needs of the employees in the matter of cleanliness. The law contemplates a complete system of washing facilities. The installation of a few spigots does not meet the requirements of this law. Sanitary wash troughs with running hot and cold water is the first item. If the industry happens to be a heated occupation, such as foundries, blacksmith shops, etc., shower baths, with hot and cold water, are also required. It is to be understood that dual facilities may be required, if the Factory Inspector is convinced of their necessity. In the case of foundries shower baths are called for, because, while a foundryman may wash his hands and face at a trough, his body remains dirty and perspired. To remove the dirt and perspiration shower baths are needed.

A room of adequate size must be set aside in a foundry, mill or workshop for the washing facilities. Where space is exhausted separate

buildings have been erected. These wash rooms must contain sanitary lockers and such other equipment, as may be necessary for the cleanliness of the men. During the cold weather such wash rooms must be properly heated, so that the men may change their clothing in comfort.

The objections of employers to this law have been set aside to a considerable extent. The law has received wide publicity and employers have become acquainted with it. It took three years to educate employers to the reasonableness of this law and still many require the best persuasive arguments, when ordered to provide wash rooms and washing facilities for their employees.

But aside from the feature of personal cleanliness of the shop employee, the beneficial effects of this have made themselves noticeable in whole communities. As has been pointed out in previous reports, the lesson taught in the factory or shop, has been learned in the employee's home. His cleaner and improved personal appearance, has instilled in him the desire to live in home surroundings that are cleaner and brighter.

During the past year 391 orders were issued by this department to a like number of establishments to install adequate washing facilities. Since the law became effective three years ago 1,231 shops, factories and mills have been ordered to provide washing facilities. Our records show that in numerous instances entire new buildings were erected to accommodate these facilities, involving expenditures in single cases of approximately \$50,000. An estimate on the part of this department would indicate that in the three years' existence of this law nearly three and a half million dollars (\$3,500,000) were invested in complying with its orders for wash facilities. This vast sum of money has been paid out in wages to carpenters, masons, plumbers and others of various trades, for materials and equipments.

During the past year 3 obstinate cases were convicted in the courts and fined \$21.60 for non-compliance with the orders of this department. Of this number, 1 case was brought in the Municipal Courts of Chicago and the remaining 2 cases in courts located in other Illinois cities and towns.

GARMENT LAW.

Inspections under this law do not confine themselves to such shops where garments or clothing alone is manufactured. The name has been adopted by popular selection. In reality this law regulates the manufacture of purses, feathers, artificial flowers, and cigars. In its intent this law seeks to enforce a high sanitary standard with reference to the making of these articles, in order to prevent the spread of contagious diseases from the home shops or contract shops to the purchaser.

In the regulation of the manufacture of these various articles this department has kept in close touch with the numerous factories by repeated visits and investigations of our deputy inspectors. During the year just ended 2,522 inspections were made in 1,630 establishments. This total number of inspections and establishments stands for the entire State. In Cook County 2,431 inspections are recorded in 1,540 places of business, while in the remaining 101 counties 91 inspections are shown as having been done in 90 shops and factories.

At the time of the enactment of the so-called Garment Law, practically all of the garment work in Chicago was done under the contract and sub-contract system; that is, the large clothing houses let their work to coat, vest and pants contractors, who in turn, distributed the work to be done in home workshops. I am glad to be able to report that these conditions have been almost fully revolutionized in the fact that today the great majority of garment work is done in large modernly constructed factories designed especially for this particular industry.

The few contract shops that exist have demanded the department's attention as to proper ventilating, proper toilet facilities, and proper aisle space. Home workshops have been almost eliminated as far as the garment trade is concerned. There are, however, other lines of work that send materials to home workshops to be finished, such as tying strings on tags, garters, arm bands, artificial flowers, etc.

THE NUT-SHELLING INDUSTRY.

Together with the State Food Commission this department made a number of inspections of home workshops where nuts were being shelled. We received complaint from several nut-shelling concerns, who had erected modern factories, that they were unable to secure experienced help, due to the fact that the help would rather work at home, the work being on a piece-payment system, as they could earn more, not being restricted by the Women's Ten Hour Law and the Child Labor Law. When this complaint reached us, we secured the cooperation of the State Food Commission, visited homes where the nut shelling was being done, and left notices that Child Labor and Women's Ten Hour Law restrictions would be enforced on the employer who sent the nuts to such homes. The State Food Commission issued orders on the employers who sent this commodity to insanitary homes, with the result that we practically eliminated that system.

OCCUPATIONAL DISEASE LAW.

This law aims to protect in particular employees in trades harmful to their health. These trades are commonly called the dusty and lead trades. However, dusty and lead trades are not the only ones within the scope of this law, but all in which poisonous materials enter the process of manufacture or where the nature of the employment is dangerous by reason of injurious and poisonous gases, fumes and vapors.

A review of the statistical tables in the chapter devoted exclusively to this subject presents a relatively small number of orders when compared with the number of inspections and establishments. The reason for this situation is that most of the establishments under regular inspections have received orders to install protective devices and to follow necessary hygienic rules during previous years. The vast majority of establishments inspected have completely complied with the department orders or are completing their installations. In other cases certain installation were made, but after completion found upon re-inspection to be inadequate.

One of the features of this law is the compulsory physical examination by a physician who must make a monthly report of his findings to the State Board of Health. The Board of Health transmits these

reports to this department, where they are classified and tabulated and made a part of the permanent files of this office. During the past year monthly examinations of an average of 8,630 employees of 250 firms were received by this department. Of this number 8,473 were reported in good physical condition and 157 were reported as suffering from occupational disease. The establishments reporting monthly upon the physical condition of their employees are divided into two groups, such as produce lead poisoning in their shops and such as occasion other industrial poisonings. In the first group 135 plants reported 5,492 well and 138 sick, in the second group 115 establishments had 3,138 well employees and 19 sick.

The "Occupational Disease Law" was enacted following the report of the committee for the investigation of industrial diseases in this State. This act was pioneer legislation in America toward human conservation in this field and as such must be regarded largely as an educational measure. However, by reason of its limited scope convictions have not always been easy to secure, at the same time our act compares favorably with existing legislation in other states in this field.

We cannot fail to realize that the workmen exposed to the hazards of occupational disease is just as much entitled to the benefits of the "Compensation Act" as his co-worker under the protection of the "Health, Safety and Comfort Law," and therefore, he should be entitled to enjoy the same privileges; however, until the scope of our present "Compensation Law" is broadened to include occupational disease, there is but remote possibility to secure compensation for loss of health, because a lawsuit is generally determined by the weight of medical experts testifying in such proceedings.

In America the principle of compensation has advanced only so far as disability from accidents. But in England, Germany, Switzerland, and Austria the workmen's compensation laws include provisions for illness resulting from a number of hazardous trades with pay amounting to 50 to 80 per cent of the regular wage, which is continued during disability. Under the English workmen's compensation act a large list of diseases are enumerated.

Manifestly the reason for compensation in case of accidents is because of the lessening of the wage-earning capacity and the consequent lowering of the social value of the workman as a necessary factor of national welfare. By precisely the same process of reasoning, compensation should be given the workman for disabilities arising from occupational diseases which impair his wage-earning efficiency or shorten the normal expectancy of his life. The underlying motive of all present-day legislation is that of the greatest good to the greatest number in order that society itself may be conserved. Therefore, the broadening of the scope of the Compensation Act of Illinois to embrace disabilities due to occupational diseases becomes a matter of justice because it is a necessary element in the logic of our collective existence.

STRUCTURAL SAFETY LAW.

This department in the enforcement of the Structural Safety Law, providing for safety in and about the construction, alteration and repair of buildings, bridges, viaducts, etc., can report that the average con-

tractor and builder is today complying with its provisions. Yet the toll of life in that industry is great and the accidents continue to occur, although they have been decreased to a considerable extent. The very nature of the industry makes it hazardous. In our report last year we explained the dangerous conditions in the well-digging industry, cited accidents, suggested remedies, and showed mechanical devices that the department would insist be installed. We have forced a compliance with our orders with very satisfactory results.

It is a melancholy fact that there is scarcely a skyscraper in Chicago which has not taken the toll of several human lives while in process of erection. Small armies of workmen daily crawl about on these huge steel skeletons and each day finds them further removed from the earth's surface. Realizing this hazardous condition this department has strictly enforced all provisions pertaining to unplanked floors, open shafts and hoistways, signal systems, and other danger points. There is ever-present the danger that because these men must exert their full strength while standing upon a footing so slight, that the least misstep or over-balance would send them whirling through space. The question of fatigue in these occupations is one of utmost importance.

During the past year accidents resulting from unsafe and improper scaffolds reached the point that necessitated joint action by the building commissioner of Chicago and this department, with the result that under the authority vested in this department by law we formulated specifications for the construction of safe and proper scaffolds to be used by painters and tuck pointers and issued orders to employers in those industries that they must comply with such specifications. During the rush of spring work in the painting line this year there was a considerable decrease in accidents.

Orders for safety nets were issued in all cases where temporary wooden floors were impracticable because of arched ceilings. In the construction of the building on the Municipal Pier in Chicago, this department ordered safety nets stretched under point where men were working, and the lives of two men were saved the first day the nets were in position, as both would have fallen over a hundred feet to a hard concrete floor.

A great number of injuries and deaths having occurred, due to faulty methods in reinforced construction work, this department made a thorough investigation with the result that we find that in this particular kind of construction work standards have not been followed very closely by builders and real neglect of consideration of safety is very evident. Improper placing of supports and properly mixed concrete forms removed immaturity, and insufficient supports, in the main, have caused the accidents that have occurred. As reinforced concrete work has come into general use only very recently, it has been and is difficult for this department to take steps that will eliminate a repetition of these accidents, due to the fact that the department cannot supervise mixing of concrete, and cannot draft regulations creating standards for forms of supports, etc.

Through the courtesy of Mr. Ernest McCullough, we have been able to issue in this report, on page 426, tables and standards devised for the proper and safe methods to be employed in this particular kind

of construction work. These standards and formulas should be, in our opinion, of extreme value to contractors and should result in decreasing the number of accidents.

During the year there were 1,054 inspections made under this law, of which 956 were made in the city of Chicago and the balance made in other cities throughout the State.

Of the total of 956 inspections in Cook County, 322 were made on buildings, 36 on bridges, 22 on stacks and tanks, 306 of stores and dwellings, and 61 on schools and churches.

A total of 148 accidents were investigated by this department, 47 of which were fatal and 101 proved nonfatal. Of this number 36 fatal and 89 nonfatal accidents occurred in Chicago and Cook County, the balance consisting of 11 fatal and 12 nonfatal accidents were found in the remaining 101 counties. Comparing these figures with those of the preceding year, we find that contractors are constantly being advised how to install more adequate safety appliances. During the past year, 435 orders were issued to provide safe scaffolds, proper floor supports, safe tackle, safe temporary floors, rails, safe hoisting machinery, barricades, and adequate signal systems.

In 15 cases it was necessary to resort to prosecution. The fines of these actions amounted to \$516.25. During the preceding year 11 convictions were had with fines aggregating \$443.

In Chicago 14 convictions with fines amounting to \$486.50 are recorded, while in other cities 1 conviction was obtained, whose fines totaled \$29.75.

The various inspection work, the subject of accidents and the principle orders during the year are discussed at greater length on page 391 of this report.

BLOWER LAW.

This law was enacted by reason of the urgent need of protection for the health of thousands of men and some women engaged in the metal polishing trade. Prior to the enactment of this law the health and even the lives of thousands of these trades people were endangered or sacrificed due to the dust danger created by the unprotected wheels of metal polishers and grinders. The greatest injury to the health of the employees results from the lint and fine particles of emery, glue and metal.

Recognizing the danger to health of workers in metal polishing and grinding industries, this department has to the fullest extent of its resources endeavored to cover the situation contemplated by the provisions of the law. We have had very little difficulty in inducing the employer to install suction systems, but the real work has been in getting systems installed so that they would be effective in the removal of dusts and grindings and much work has been necessary in the way of inspections and written orders issued to get employers to see that their systems were kept to a high state of efficiency by maintaining five-inch pressure and keeping the pipes thoroughly clear.

The inspection records of the department show that 1,104 visits in 339 shops and factories throughout the State were made. These 339 shops and factories employed 3,086 men and 36 women, who operated metal polishing machinery.

Out of the 339 places inspected, 329 were located in the city of Chicago, and 10 in other cities or towns in Illinois. In the 329 Chicago shops we found that 12 were exempt under the law from the requirements regarding blowers, on account of having only one machine. The total 3,122 men and women employed in operating metal polishing wheels were divided as follows: 2,028 men and 20 women in Chicago and Cook County and the balance 1,058 men and 16 women, being in the remaining 101 counties of the State.

How constant and thorough this class of inspections has been will be realized from the large number of orders issued by the department for corrections and installations. The condition of the shops depend almost entirely upon the frequency of inspections. Employers will not go to the trouble of finding out whether the suction system on their polishing wheels are working efficiently. Frequently, complaints are received by this office, calling our attention to neglected systems.

There is one bad feature of the present law to which attention must be called, that of exempting the shop having one polisher. As a rule, this exemption works an evil. The present exception in the law should be repealed.

Attention for remedial legislation is also necessary in the case of overhead suction systems. These should be prohibited.

A more intimate discussion of this subject and statistical tables will be found on page 374 of this report.

BASEMENT LAW.

This law is the latest addition to the labor laws enforced by this department. It was enacted by the Forty-ninth General Assembly and approved by your Excellency on June 29, 1915.

The object of this law is to curb certain vicious employments when carried on in basements and to secure more healthful working conditions for employees in certain industries by locating such shops above the ground. The law enumerates these dangerous basement employments, as metal polishing, grinding, plating and dipping. The men in these classes of occupations, especially where the business is conducted in basement shops, endanger their health on account of the poisonous or noxious fumes or dusts which are created in the course of the manufacturing process.

As these shops are located below the surface of the ground, they are usually damp, dark and poorly ventilated. In fact, it is impossible to ventilate basement shops properly. This department has enforced both the spirit and the letter of the law.

When the law became effective last year owners of basement shops were served with notice that their business must be conducted above the ground. Objections, of course, were received from employers who were tied up on leases for basement premises. Where such leases had a limited time to run, not extending over six months, no action was taken during that period. In all other cases removal of the basement shop was ordered immediately. During the last year 14 orders were issued to close basement shops. In a few instances, this department was forced to institute court proceedings before securing compliance with its orders.

ICE CREAM AND BUTTERINE LAW.

This act was placed on the statute books by the Forty-fifth General Assembly.

The law aims to compel manufacturers of butterine and ice cream to maintain such healthful and sanitary conditions on their premises as to preclude the possibility of pollution or contamination of their product during the process of manufacture. Under this law only such places that conduct their business in compliance with its provisions receive a certificate from the Factory Inspector.

Of the larger plants little criticism can be made. It is with the small shop owner, the foreigner, who conducts his manufacturing process in a basement, that this department find most difficulty. It has been the rule of the department to compel all manufacturers of ice cream to calcimine, to properly ventilate, and install sanitary conditions such as drainage.

During the past year this department made 183 inspections in 183 establishments under this act, 158 of which were located in the city of Chicago and 25 in other Illinois cities and towns. To the total 183 places inspected, 177 received certificates, of which number 152 were granted to proprietors of manufactories in Chicago, and the balance 25 were issued to the owners in other cities and towns in the State. A total of 6 places were refused certificates, all of which were located in Chicago.

During the year the department has been called upon to prosecute in the courts only one case where flagrant and persistent violations have occurred.

Most of the 183 establishments were located in basements, the number being 113. Fifty-five were on the first or ground floor and 15 on the second floor.

The majority of proprietors or owners of these 183 establishments were foreigners. Eighty-four places were owned by Greeks, 42 by Italians, and 57 by Americans.

The number of orders issued to remedy unsanitary conditions in these shops is 278 for the past year.

The so-called Ice Cream and Butterine Law was enacted and given to this department for enforcement before the creation by the Legislature of the State Food Commission. Today that department must inspect these establishments to ascertain that the ingredients in butterine and ice cream are pure and wholesome. This is a duplication of inspection and I respectfully recommend that an amendment be made to this law that will make the State Food Commission the enforcing department of this statute.

NIGHT INSPECTIONS.

This department is required to keep some of its deputies (and at some seasons of the year most of the entire force of deputies) working nights in addition to their regular tour of duty during the day. There are three principal reasons for night inspections:

1. The rush preceding the holiday season.
2. Seasonal trades with their temptation to work overtime; such as milliners, dressmakers, florists, and others at Easter time.

3. Complaints are received of violations of the Women's Ten Hour Law or Child Labor Law that necessitate an inspection at night. Most complaints of this class cover hotels, restaurants, factories, retail stores, theatres, and amusement parks.

The results of these night inspections in tabulated form are as follows:

Law.	Number of establishments.	Number of inspections.	Employees.					Total children 14 to 16.
			Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.	
Child Labor Law	864	2,531	36,005	16,901	18,840	116	148	264
Ten Hour Law...	96	181	6,658	2,118	4,504	10	26	36
Garment Law...	722	2,196	96,294	14,667	21,481	52	94	146
Total.....	1,682	4,908	78,957	33,686	44,825	178	268	446

COMPLAINTS.

When I took charge of this department three years ago I instituted the policy of causing an inspection to be made upon every complaint received, whether it was anonymous or otherwise, having in mind the fact that the wage-earners whom the State intends to protect by the laws that this department enforces, in most instances, cannot afford to divulge their identity in connection with a complaint because it means in every case discharge from employment. This policy has become quite well known to the workers, with the result we receive a goodly number of complaints.

CLASSIFICATION OF COMPLAINTS RECEIVED AND THE RESULTS OF INVESTIGATION.

Year.	Total number of complaints.	Child Labor Law.	Women's Ten Hour Law.	Blower Law.	Structural Law.	Ice Cream and Butterine Law.	Health, Safety and Comfort Law.	Occupational Disease Law.	Wash House Law.	Miscellaneous.	Meritorious complaints resulting in violations.	Per cent of meritorious cases reported.
1908.....	272	258	.....	1	.....	8	.....	.....	.....	5	91	0.33
1909.....	268	237	26	1	1	.....	.....	.....	.....	2	85	.31
1910.....	282	132	68	17	3	.....	.....	.....	.....	.....	101	.36
1911.....	713	202	344	35	.....	130	.....	1	.....	.....	312	.44
1912.....	1,157	259	662	43	7	167	.....	4	.....	15	536	.47
July 1, 1912, to June 30, 1913	455	118	251	13	2	67	.....	3	.....	.....	237	.52
July 1, 1913, to June 30, 1914	1,265	296	709	28	37	151	.....	11	32	.....	685	.54
July 1, 1914, to June 30, 1915	1,150	277	585	17	19	182	.....	6	44	18	662	.58
July 1, 1915, to June 30, 1916	1,287	331	593	18	81	225	.....	15	6	18	671	.52

As the table shows, a total of 1,287 complaints were received during the last year. Of this number, 671 or .52 per cent, proved to be well-founded.

Most complaints received last year were alleged violations of the "Women's Ten Hour Law" and, as the table shows, this law has occupied first rank in the five previous years. The "Child Labor Law" complaints rank second in number since 1911, when the advantages of the "Women's Ten Hour Law" began to be known among employees in

general. The number of complaints reciting possible violations of the "Health, Safety and Comfort Law" occupy third place. The balance of the complaints are scattered among the remaining seven laws enforced by this department.

Most complaints are telephoned to this office, others are received through the mails, and the balance are made in person. As a rule, when a complaint is made by an employee, the informant refuses to divulge his name, except in some few instances, where a request is made for a report of the results of the investigation. Numerous welfare organizations, labor unions, women's clubs and other civic organizations send us complaints and invariably request a report upon the investigation.

As has been pointed out in previous reports, most of the complaints alleging violations of the "Women's Ten Hour Law" are made by girls at work in restaurants, stores, or factories. These women are being educated in the law by various agencies and, while they hesitate about calling the attention of their employer to infractions of this law, they nevertheless take the means of informing this office to have their grievances adjusted, thereby avoiding both unpleasantness with their employer and possible discharge.

Complaints that require night inspections became so numerous that on March 1 last, I found it necessary to detail two deputy inspectors in Chicago exclusively to night work. During the time that this special night force of two has operated they have done very effective work, and it has served as notice to employers who are liable to the temptation to violate the laws restricting hours of labor, to be careful in that regard.

The following table shows that 616 or 48 per cent of the complaints upon investigation were without merit. This does not mean, that in 48 per cent of the cases merely suspicion existed. A great number of the complaints alluded to subjects and conditions over which this department has no jurisdiction and is powerless to act. For example, we frequently receive letters asking the department to assist in obtaining an employee's wages, or to prohibit the employment of women on Sundays. Such complaints which should have been addressed to other State or municipal bureaus, are transmitted to the proper authorities.

The following samples of complaints transcribed in the original text selected at random show that even our less fortunate in educational qualifications are alive to the protection of the labor laws:

(1) SIR: I am letting you know that its afful that the girls had to work 12 hours a day in Laundry, and they get pay for 10 hours. If the inspector comes he tells the girls they should say that they work 10 hours. I had to work sometimes 13 hours in summer so I wish the inspector come and see himself they work 12 hours a day.

His neibber.

(2) DEAR SIR: I am a poor boy 15 years old. My employer makes me suffer a lot. He makes me work from 7.30 a. m. till 10 p. m. every day in the week except Sundays, I work until 2.30 p. m. Ive read your letter which I found and I thought Id write too you so that my boss wont lie. I cant find another job because I lost my certificate. Please help me out because my boss is a blood sucker.

Your little friend.

(3) DEAR SIR: I wish to inform you to sent a inspector to the store as they are keeping inhuman hours for their help and basement is very unsanitary and oblige the mother of an employe.

(4) *State Factory Inspector.*

DEAR SIR: I feel it my duty to inform you of the viciously vile condition of the ventilation of the first floor of the Corset Co. I live with a girl who comes home every evening with a headache due to the same.

As a bit of inside information the president of the company in conference (one day last week) when the matter was referred to him, said it was of too little consequence to take time discussing it. Thanking you, I am

(4) *State Factory Inspector.*

DEAR SIR: Please send one of your men go and see how conditions are at Company, 3d floor St. They run two buffers at one time also 2 polishers at one time so there 4 which running all the time without a fan or suction pipe. I kicked to the boss about it, he said its all right the way it is. I said to him the machines are all red from triply, the floor the same, this shop needs attention because it was against my health and the man. Please act at once, thanking you for same,
Foreman.

(5) *Department of Factory Inspection.*

DEAR SIR: I beg to call your attention to my following complain: Am a girl working in one of the millinery stores on St. All the millinery stores on st. are kept open until 11.30 p. m. and the girls are compelled to work that late at night. Some eve. however we work until 11 p. m. We are supposed to work from 10 a. m. to 10 p. m., we must come promptly to the minute in the morn, while we are made to work one hour and a half at night extra with no pay at all for the extra time. There are a good many girls that live far away and they can not get home before 12 or 12.30 at night. We risk with our jobs if we dare complain.

We are well tired out after 10 o'clock and business is very dull so late, and if we ask to close the store, we are told that the others are open so we must keep open too, and we dare not leave the stores at 10 o'clock.

We have heard that there is a law that women should not work more than 10 hours a day, undoubtedly you had noticed that conditions as such prevail in the millinery stores of that neighbourhood, therefore we have decided to ask you to be so kindly and investigate, most surely you will find out that it is true.

I beg to suggest if there is any possible way to have your investigator come after 10 o'clock because if we be questioned in the presence of our employer we will have to ascertain his statement for fear of getting discharged.

I don't sign my name for I do not know if it will be kept secret, and again I don't write this for myself alone, but for all the girls that work in the said stores,

Thanking you in advance, I remain X.

(6) DEAR SIR: I wish to inform you that who lives at St. is not yet 16 years of age and is working 55 hours per week ats Department Store St. He is working as wagon boy or parcel collector, I do not know which. If there is any justice in the land you would see to this boy. *He is rather thin looking and wears long pants.* I know this because I am a friend and have talked to him. He is a rather bright lad and has his own ideas about things which he looks at from both sides. Something good could be gotten out of him, try to get him away from his 55 hour job at Department Store and you will greatly oblige me, or better still you could have a talk with him,

Yours Graciously,

From an friend.

(7) DEAR SIR: If you want to help the Bootblack Boys sent a man to see how they sleep some place like dogs the main is at St. and if you want to help them to work short hours because they work 15 and 18 hours a day and never get a off tal but work seven days a week Please help the Boys and I am a boot black to Please do that Don't forget please.

My name is

(8) DEAR SIR: *To whom it may concern.* As I read up in the paper about child labor I want to call your attention to a girl that lives in the

locality she never drew out her ceretificate and she work 10 hours a day and she is but 14 years old. She works in a mop factory at and Sts. her name is and resides at Ave. I don't see why a man hires a girl with out a ceretificate the law is not very stirck I wish you would give this to the inspector of child labor have him look in to it little deeper and oblige

One against child labor

Then her mother brag that the girl makes 9 dollars a week leave the girl make it that of age.

GENTLEMEN: I do not know whether inspection of Grain Elevators come under the head of Factory Insp. or not or whether one should complain to the State Board of Health.

I should like to call your attention to the unsanitary condition of the Elevator owned and operated by located at There are no accommodations of any kind for the men who must work there—and a number of them are ailing all the time. No toilets no water excepting dirty water from dirty pipes and half the time no heat. Nearly all the men are troubled with rheumatism. If this come within your official authority, will you kindly take this matter. My husband works there and as he cannot afford to loose his occupation, you will understand why I would rather not give you my name, but it makes my heart ache to see him miserable all the time. I am gentlemen

Yours respectfully,

An Intelligent wife.

PROSECUTIONS.

Although the department has pursued a policy of education and persuasion, some employers, however, still fail to be impressed with this method and necessitate the more forceful tactics of prosecutions to bring them to time.

During the fiscal year just ended 496 suits resulted in convictions. The fines and costs in these cases amounted to \$9,054.96.

The following table is a recapitulation of the results of prosecutions and shows that 220 convictions with fines and costs amounting to \$4,199.60 were secured in the city of Chicago, while in other cities and towns 276 convictions were had, the fines and costs of which totaled \$4,855.36.

In Chicago, a total of 70 violations of the "Child Labor Law" were obtained, which were brought on the following charges: for working children over eight hours per day, 31 cases; for employing children before 7 o'clock in the morning or after 7 o'clock in the evening, 6 cases; for employing children under fourteen years of age, 7 cases; for employing children without age and school certificates, 19 cases; for obstructing the inspectors, 3 cases. Failure to comply with the "Women's Ten Hour Law" resulted in 37 convictions on the charge of working female help in excess of ten hours per day and for neglecting to keep a time record, as required by section 5 of this law, 69 convictions. Our court records further show, that in Chicago 25 convictions were obtained for failure to comply with the "Health, Safety and Comfort Law," 14 convictions under the "Structural Law," one conviction under the "Wash House Law," 3 convictions under the "Occupational Disease Law," and one under the "Ice Cream Law."

In the other Illinois cities and towns a total of 276 convictions are reported with fines and costs amounting to \$4,855.36.

"Child Labor Law" violations resulted in a total of 132 convictions, based on the following charges: for employing children over 8 hours

per day, 26 cases; for working children before 7 o'clock in the morning and after 7 o'clock in the evening, 17 cases; for employing children under fourteen years of age, 18 cases; for permitting children to be employed on dangerous machinery, 4 cases; for attempting to employ children without an age and school certificate, 65 cases.

The number of convictions under the "Women's Ten Hour Law" totaled 117, of which 25 were obtained on charges of employing women over 10 hours per day and 92 for failure to keep a time record. Twenty-four convictions were received for violations of the "Health, Safety and Comfort Law"; 2 for violations of the "Wash House Law," and one for violations of the "Structural Law."

Laws.	Number of convictions.		Fines and costs.	
	In Chicago.	Outside Chicago.	In Chicago.	Outside Chicago.
Child Labor Law—				
Over 8 hours.....	31	26	\$383 00	\$299 05
Before 7 a. m. or after 7 p. m.....	6	17	96 00	152 25
Without age and school certificate.....	19	65	413 00	672 78
Under 14 years.....	7	18	65 00	234 65
Violation section 11.....	4	4	60 00	51 45
Over 48 hours per week.....	4	2		74 60
Working on false affidavit.....	3		80 75	
Obstruction.....				
Total.....	70	132	\$1,097 75	\$1,484 78
Ten Hour Law—				
Over 10 hours.....	37	25	\$1,027 50	\$772 10
No time record.....	69	92	869 05	892 45
Total.....	106	117	\$1,896 55	\$1,664 55
Health, Safety and Comfort Act.....	25	24	\$613 30	\$1,660 70
Structural Law.....	14	1	486 50	29 75
Wash House.....	1	2	6 00	15 60
Occupational Disease Law.....	3		40 75	
Ice Cream Law.....	1		58 75	
Grand total.....	220	276	\$4,199 60	\$4,855 36
		496		\$9,054 96

CITIES AND TOWNS VISITED.

During the fiscal year just completed 321 cities and towns were visited by our deputy inspectors for the purpose of inspecting establishments located in these various towns. During the preceding year 296 cities and towns had been visited. The number of deputy inspectors for the present and previous year was the same.

In this connection attention must be called to the inadequate size of the inspection force. There are 102 counties in this State containing approximately four hundred cities or towns whose manufacturing or mercantile establishments need supervision and inspection by deputies of this department. How difficult it is for this department to cover all these towns with a small force of inspectors will be better understood, when it is pointed out that poor transportation facilities cause much loss of time, that big jumps are often required, especially when an important accident must be investigated, and that only part of the force can be maintained on the territory outside of Cook County. There is

more than enough work for so small a force as the present one to keep them continuously engaged in Chicago. If the Legislature would increase our inspection force, the inspections could be made to cover not only more ground, but many more establishments with less loss of time in traveling.

RECOMMENDATIONS.

I desire herewith to briefly review the recommendations contained in my comments on the various laws in the preceding pages of this report.

CHILD LABOR LEGISLATION.

I have urged further restriction of child labor to prohibit the employment of minors under the age of 16, except in vacation time.

I have further recommended that the Mother's Pension Law be amended so as to make pensions of widows and mothers whose husbands are incapacitated, payable until children are 16 years of age. In addition thereto, I have suggested that where the father is employed at wages inadequate to support the family and keep his children in school until 16 years of age, that legislation providing an allowance that would permit children to continue in school until of that age should be enacted as a means far more economical than permitting children to grow into adult life with a physique and mentality undermined as a result of early labor, afterwards to become rejects in the labor market and public charities.

VOCATIONAL EDUCATION.

I have also pointed out the need for vocational education along fundamental American lines. By that, I mean, vocational education in connection with the public school system that now exists, making it a unit system and thereby preventing the establishment of class distinction in connection with our educational system when vocational education is instituted—as it should be—without loss of time.

WOMEN'S HOURS OF LABOR.

In the preceding pages, in discussing the Women's Ten Hour Law, I have tried to show that Illinois is a decided follower rather than a leader in the conservation of the health of our women wage-earners, in the fact that a number of the states have greater restrictions regarding hours of labor of women than has Illinois. I have pointed out that the United States Congress has seen fit to enact eight-hour legislation for all of its employees, most of them male employees, and, certainly, there is at least equal need for as much protection for the women wage-earners of Illinois, the future mothers of the race.

STRUCTURAL SAFETY ACT.

There is need for several amendments to the existing statute providing for safety in and about the construction, alteration and repair of buildings, bridges, viaducts, etc. Particularly is there need for amendment or new legislation that will regulate conditions under which reinforced concrete work is done, so as to provide safety for the workers engaged therein.

ICE CREAM AND BUTTERINE LAW.

In the preceding pages I have pointed out that the law providing for sanitary conditions in and about places where ice cream is made was enacted previous to the establishment of a Pure Food Commission, and today there is a duplication of work by these departments. I earnestly recommend that the statute this department now enforces be amended so as to make the State Food Commission the enforcing agency, as it is today charged with the duty of visiting these places to inspect the ingredients entering into ice cream and butterine.

AMENDMENT TO THE WORKMEN'S COMPENSATION ACT NECESSARY TO
MAKE EFFECTIVE LAWS PROVIDING FOR SAFETY OF THE
WAGE-EARNERS.

Three of the laws enforced by this department distinctly impose upon employers in this State specified duties for the protection of employees against accidents. The great majority of employers are cooperating and complying sincerely with such statutory regulations as are contained in the Health, Safety and Comfort Law, the Structural Safety Act, and the Child Labor Law; but there are some employers who have elected to come under the provisions of the Workmen's Compensation Act and having insured their employees with liability insurance companies, deliberately fail to comply with the provisions of the aforementioned statutory provisions, because some of them necessitate an expenditure of money. The present Workmen's Compensation Act provides that the employer must pay the compensation specified in the act to the injured workman, regardless of how the injury occurred, if it occurred in the line of the employee's duty. The compensation granted by the act is, of course, limited. Previous to the enactment of the Workmen's Compensation Act, the courts, including the Supreme Court of this State, held that any accident resulting in an injury to a workman, caused as a result of the employer violating any statutory provision providing for safeguarding against accidents, had a right of action against the employer for an unlimited amount of damages and stripped the employer of the common law defenses of assumption of risk, contributory negligence and fellow servant.

The Illinois Supreme Court, in the case of Milford E. Streeter, Appellant, versus the Western Wheeled Scraper Co., in February, 1912, commenting on this case, which had its origin before the enactment of the Workmen's Compensation Law, used the following language:

"* * * Experience had shown, before the passage of the statute, (meaning the Health, Safety and Comfort Statute), that many employers would not exercise a proper degree of care for the safety of their workmen. The servant had to assume the risk of injury and the master took the chance of a suit for damages. It was to meet this precise situation and to protect employees in such situation that this legislation was adopted. It imposes upon the master an absolute specific duty—one which he cannot delegate *and against his neglect of which he ought not be allowed to contract*. If the employee must assume the risk of the employer's violation of the statute the act is a delusion so far as the protection of the former is concerned. He is in the same condition as before it was passed. * * * Justice requires that the master and not the servant should assume the risk of the master's violation of the law enacted for the servant's protection, and in our opinion, this view is in accordance with sound principles of law.

"For many years we have held, in the construction of the Mining Act, that neither assumed risk nor contributory negligence is available as a defense to a suit for damages caused by a wilful violation of the provisions of that act."

The situation this department finds existing among some employers is that in view of the Compensation Act providing a specific amount of compensation, regardless of what may have or how the injury was caused, they feel that an expenditure for safeguarding is unnecessary. Such an attitude not only makes the statutes providing for safety of employees a delusion as far as protection is concerned, but places a premium on violations of statutes intended to prevent the destruction of life and limb.

The employer who is obedient to our safety statutes (and that embraces the vast majority of employers) cannot but join with me in the feeling that employers who violate safety statutes should be required to permit a jury to decide the amount of damages due the injured employee; first, as a matter of justice to the employee whose injury could have been prevented, and secondly, in order that such employers may not continue by their violations to increase accidents and arouse public sentiment to the necessity for increasing compensations now provided for in the Compensation Act, which is today based on average, unavoidable accidents.

In order to correct the situation above described, I respectfully recommend that section 6 of the Workmen's Compensation Act, as amended July 1, 1915, which deals with the employees' right to recover damages, be amended by adding thereto the following: "*That when the injury to the employee was caused by the failure or omission of the employer to comply with statutory safety regulations, nothing in this act shall affect the civil liability of the employer. If the employer is a partnership, such failure or omission must be that of one of the partners thereof, and if a corporation, that of any elective officer or agent in charge of the employment.*"

If the above amendment is adopted to the Compensation Act, it will have the effect of giving to the workman who has been injured by reason of his employer violating the safety statutes, a right to take his case into the civil courts, where the employer will be stripped of his common law defenses, and receive damages in excess of what the Compensation Law would give him; for instance, today as the Compensation Law stands, if a workman in the building trades industry is killed, by reason of his employer violating the safety statute by not properly planking floors, enclosing hoistways, etc., his family, under the Compensation Act, can only receive a sum between \$1,600, minimum, and \$3,500, maximum, *while this amendment makes it possible for his family to receive a sum up to and including \$10,000, maximum, provided for by statute as damages for a death.*

Take the case of *Beauchamp v. Sturges & Burn Mfg. Co.*, which was carried to the Supreme Court of the United States. In that case the plaintiff, a boy under 16 years of age, was employed on a punch press, in violation of the Child Labor Law. This was prior to the enactment of the Compensation Act. The case was filed in the Superior Court of Cook County and the employer was barred from asserting the common law defense of assumption of risk. *The jury awarded damages*

of \$4,500. Under the Compensation Act of today, figuring the boy's salary was \$12 per week, he would have received for the loss of his three fingers, half-pay, amounting to \$510.

Another instance, an expert machinist employed as a toolmaker, receiving a salary of \$30 per week. He loses the first finger, commonly called the index finger, because his employer had violated the law and failed to guard the gears. Under the present Compensation Act, *he would receive \$12 per week for thirty-five weeks, or \$420.* No one can contend that \$420 is adequate compensation for the loss of an index finger, which will disable an expert machinist for the rest of his life, because his employer violated the safety statute. *If the above amendment were adopted, his employer having violated the statute would be in court and not permitted to plead assumption of risk and contributory negligence, and it requires no stretch of the imagination to agree that a jury would give him at least ten times the amount allowed under the Compensation Act.*

The real effect of such an amendment to the Compensation Law would be that every employer would take particular pains to comply with the safety statutes of this State and not unnecessarily jeopardize the life and limb of the workers.

REGISTRATION OF EMPLOYERS.

At the last session of the Legislature I had introduced a bill that had for its object compelling employers of five or more employees to report annually to this department the name of the concern, whether a corporation, partnership, or individual employer, location, nature of business, and number of employees. The reason for the introduction of the bill is the fact that today this department has no way of knowing where employers are located. In Chicago, many of them are in residential districts on back lots and out on the outskirts of the city; likewise some of the smaller cities and towns. The result is that some employers are inspected once or twice a year, others never receive an inspection. I earnestly recommend the enactment of a law to compel employers to give the above descriptive information to this department annually.

DEPARTMENTAL SALARIES.

In my annual report for the year 1913-14, preceding the last session of the Legislature, I pointed out at great length the need for additional deputy inspectors and the urgent need for an increase in salary for the deputy inspectors. Deputies at the present time receive a salary of \$1,200 per annum. The duties require them to be men versed in mechanics and have technical knowledge embracing almost the entire field of mechanics. They come in daily contact with superintendents, managers, and owners of large industrial establishments, most of whom are high-salaried men, experts in their particular line. The deputy must be able to convince these employers or their representatives of the need of various safeguards and how such guards shall be constructed. That a salary of \$1,200 per annum is inadequate, none can deny.

Almost all of the inspectors in other State departments receive greater compensation than the Deputy State Factory Inspectors; for instance, deputy fire marshals, food inspectors, lodging house inspectors, inspectors of licensed employment agencies, all receive \$1,500 per

annum, and their duties are not as complicated as the factory inspectors who have ten laws to enforce to other department's one.

The city of Chicago pays its building inspectors, sanitary inspectors, fire-escape inspectors, electrical inspectors, decidedly higher salaries than our deputies receive. The deputy factory inspectors of other states, such as New York, Pennsylvania, New Jersey, Indiana, Wisconsin, Rhode Island, Texas, etc., receive from \$1,500 per annum, up.

The Chief Factory Inspector has under his supervision 30 deputy inspectors and office force, charged with the enforcement of ten State statutes, and receives a salary of \$3,000 per annum. The Food Commissioner of this State receives a salary of \$3,600—he is charged with the enforcement of one statute; the Chief Grain Inspector, \$7,000 per annum; the Chief Inspector of Licensed Employment Agencies with six deputies, \$3,600 per annum; Deportation Agent of the State with one assistant, \$3,600 per annum; the president of the Civil Service Commission, \$4,000 per annum; members of the Industrial Board, \$5,000 per annum; members of various commissions and heads of other departments might be mentioned, whose comparative responsibility is decidedly not greater than that of the Chief State Factory Inspector, (charged with the conservation of the life, health and limb), meritoriously receive salaries decidedly in excess of the \$3,000 per annum paid the Chief State Factory Inspector.

The only apparent explanation for the inadequate salaries paid in the State Factory Inspection Department is that the department was created 23 years ago when the purchasing power of the salaries was greater than today, and evidently the Legislature with its many duties and responsibilities to perform in a short space of time never gave a thought to the justice of providing salaries commensurate with the added duties and responsibilities placed upon this department.

CONCLUSION.

This brief account of the work for the past year will make clear how important the factory laws are to the army of industrial workers in this State. It is a source of satisfaction to know that the laws have been instrumental in improving the conditions under which many thousands of persons must earn their livelihood. The opportunities for bringing a little more comfort and protection into the lives of such a large number of persons are many and varied, and those charged with the administration of the law and enforcement of the orders for safety cannot but be imbued with the serious character of their responsibilities.

The history of factory legislation shows that there is a primary or educational period, during which the people have to be lead gradually into the advanced or modern stages of factory inspection. During the past three years there has been pursued a policy of education and persuasion, and by looking back over that period of time, and noting the many improvements in conditions and the changed attitude of many employers towards the factory laws, there are good reasons to be satisfied with the results of that policy. But while education and persuasion have been the general policy, there have been, of course, cases where sterner measures have had to be used. With many employers it is not now a matter of "enforcing the laws," they realize their merits, and

the factory inspector is asked to give his advice in an advisory capacity. With others, who have not been susceptible to the methods which we have been employing, there must be a more progressive policy. It cannot be expected, nor is it fair to others, that the factory inspector should continue to "reason with" careless or indifferent employers for an indefinite time. We must continue to make progress and pursue a more advanced policy of factory inspection. When the inspector is satisfied that certain things are necessary to protect the worker he should be able to give mandatory orders to take immediate effect, and then see that they are complied with. In many respects our laws will be found wanting and not adequate to deal with every present condition. That being a fact, we should strive to keep abreast of the times by giving our workers all that the most modern factory legislation provides. We must see to it that the hazard of industry is not aggravated by unguarded machinery, and that workmen are not made sick or prematurely old by unhealthy conditions—that the health of the children and women be conserved by short hours of labor, that the child of today will grow up as a vigorous worker of tomorrow, and that the future mothers of our State be surrounded with every possible safeguard to insure an efficient and capable citizenship.

In closing my third annual report to your Excellency, and the twenty-third of the department, I wish to record my appreciation of the kindly interest that you have taken in my work during the past three years; the careful consideration which you have accorded me in everything about which I had occasion to consult you, which has given me much encouragement and testifies to your sympathy for the welfare of the many thousands of industrially employed in our great State.

Respectfully submitted,

OSCAR F. NELSON,
Chief State Factory Inspector

RESULTS OF INSPECTIONS ACCORDING TO THE "CHILD LABOR LAW."

The essential features of the "Child Labor Law" are as follows:

(a) No child under the age of 14 years may be employed at any occupation, except in agricultural pursuits, during such months when the public schools are not in session.

(b) Before employing any child between 14 and 16 years of age every employer must obtain and keep on file an approved age and school certificate containing a correct description of the child and sworn to by the parent or guardian.

(c) Every person employing 5 or more children 14 to 16 years old must post in every room, where children are at work, a list containing the name, age and address of each child.

(d) No child under the age of 16 years shall work more than 8 hours in any 1 day; nor more than 48 hours in any 1 week; and no child shall be permitted to work before 7 o'clock in the morning or after 7 o'clock in the evening.

(e) No child under 16 years of age may be employed in any bowling alley, theater, place of amusement where intoxicating liquors are sold, or as operator of elevators, or at any dangerous machinery, or in any other employment which may be considered dangerous to life or limb, or where its health may be impaired or its morals depraved.

(f) The presence of any child under 16 years of age in any establishment within the scope of this law is *prima facie* evidence of its employment.

The following table shows the results of inspections under the "Child Labor Law" during the year July 1, 1915, to June 30, 1916, in comparison with the preceding year:

TABLE NO. 1—INSPECTIONS UNDER CHILD LABOR LAW.
Comparative for the years July 1, 1914, to June 30, 1915, and July 1, 1915, to June 30, 1916.

Location.	Year.	Number of establishments inspected.	Number of inspections.	Number of employees.						
				Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.	Total number of children under 16.	Percent of children under 16 to total employees.
Chicago and Cook County..	1915-16	21,190	24,406	364,446	261,175	98,212	2,458	2,601	5,059	1.4
	1914-15	21,486	26,178	404,593	286,282	13,457	2,750	2,104	4,854	1.
Outside Cook County	1915-16	11,513	12,741	179,034	139,576	38,051	828	579	1,407	.7
	1914-15	10,774	12,201	134,751	107,018	26,782	625	326	951	.7
Totals	1915-16	32,703	37,147	543,480	400,751	136,263	3,286	3,180	6,466	1.2
	1914-15	32,260	38,379	539,344	393,300	140,239	3,375	2,430	5,805	1.07

The preceding table shows that a total of 37,417 inspections was made of 32,703 establishments located throughout the State. According to the figures in this table 6,466 children under 16 years of age were employed. Comparing this number of children with the total number of persons employed, we find that child labor in this State amounts to 1.2 per cent.

For Cook County 24,406 inspections of 21,190 establishments are recorded. There were 2,458 boys and 2,601 girls between 14 and 16 years of age at work making a total of 5,059 children, forming 1.4 per cent of the total number of persons employed.

In the 391 cities and towns visited outside of Cook County 12,741 inspections of 11,513 establishments were made. These shops and factories employed a total of 1,407 children between 14 and 16 years of age, 828 being boys and 579 being girls. The percentage of children to total employed in establishments outside of Cook County is .7 for the year just completed.

Table No. 2 shows the number of establishments located in Cook County and inspections according to seven industrial classifications, together with the number of persons employed in each group:

TABLE NO. 2.

Industry.	Number of establishments.	Number of inspections.	Number of employees.				
			Total.	Males.	Females.	Children under 16 years.	
						Boys.	Girls.
Manufacturing	5,157	6,524	271,076	217,816	50,701	1,403	1,156
Stores and mercantile establishments	12,552	13,325	59,239	24,508	31,576	866	1,289
Offices	1,407	1,893	10,174	6,593	3,422	92	67
Amusements	95	165	3,566	1,819	1,734	9	4
Institutions	35	64	2,844	1,690	1,121	21	12
Hotels and restaurants	1,235	1,414	8,609	4,866	3,718	19	6
Laundries, cleaners and dyers	709	1,121	9,938	3,883	5,940	48	67
Total	21,190	24,406	364,446	261,175	98,212	2,458	2,601

This table indicates that two groups of establishments those engaged in manufacture and those engaged in merchandizing claim the largest number of children under 16 years of age. In the 5,157 manufacturing places 1,403 boys and 1,156 girls found employment, while in the 12,552 stores and mercantile establishments 866 boys and 1,289 girls were found at work. In offices 92 boys and 67 girls were put to work, and laundries, dyers and cleaners carried 48 boys and 67 girls on their payrolls. The small remainder found employment in hotels, restaurants, institutions, and places of amusement.

Table No. 3 enumerates 391 cities and towns outside of Cook County in which 11,513 places of business received 12,741 inspections. The number of employees is given for each town and in each instance where children were found at work the percentage of child labor is indicated.

TABLE NO. 3—SUMMARY OF INSPECTIONS ACCORDING TO CHILD LABOR IN CITIES AND TOWNS OUTSIDE OF COOK COUNTY.

July 1, 1915, to June 30, 1916.

City or town.	Number of establishments.	Number of inspections.	Number of employees.						Per cent of children to total employed.
			Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.	Total under 16.	
Abingdon.....	42	42	314	239	25				
Agnew.....	1	1	2	2					
Albany.....	9	9	22	16	6				
Albion.....	25	29	178	159	19				
Aledo.....	31	31	128	101	27				
Algonquin.....	2	2	18	17	1				
Alpha.....	4	4	18	9	9				
Altamont.....	8	8	44	44					
Alton.....	148	150	4,120	3,317	752	21	30	51	1.2
Amboy.....	16	16	135	104	29	2			
Anna.....	22	22	566	330	236				
Annawan.....	8	8	20	15	5				
Antioch.....	8	8	25	20	5				
Apple River.....	5	5	9	6	3				
Arcola.....	17	17	77	59	17	1		1	1.3
Area.....	4	4	6	5	1				
Arthur.....	9	9	38	29	9				
Assumption.....	60	60	147	124	23				
Ashley.....	6	6	12	12					
Ashton.....	5	5	6	6					
Astoria.....	18	18	51	41	10				
Aurora.....	166	239	8,591	5,746	2,578	74	193	267	3.1
Barrington.....	4	4	28	28					
Barry.....	9	9	28	18	10				
Batavia.....	9	10	57	40	17				
Beardstown.....	1	1	311	311					
Belmont.....	8	8	12	12					
Belvidere.....	126	146	2,715	2,181	530	2	2	4	.1
Bellville.....	64	64	382	245	134	3		3	.8
Benton.....	7	8	10	10					
Big Foot Prairie.....	1	1	23	23					
Blackstone.....	1	1	2	2					
Blandinsville.....	11	11	24	18	6				
Bloomington.....	394	394	6,177	5,154	1,009	14		14	.2
Bluffs.....	18	18	77	74	3				
Breese.....	63	63	137	121	15	1		1	.7
Bridgeport.....	22	26	110	93	17				
Brookport.....	6	6	69	67	2				
Bryce.....	1	1	3	3					
Buckner.....	5	5	63	63					
Buda.....	27	28	103	96	7				
Bunker Hill.....	27	27	65	56	9				
Bushnell.....	34	37	247	194	53				
Byron.....	3	1	78	71	7				
Cairo.....	276	276	3,049	2,637	405	6	1	7	.2
Caledonia.....	4	4	12	10	2				
Cambridge.....	20	20	59	47	12				
Canton.....	81	81	595	314	279	2		2	.3
Capron.....	1	1	1	1					
Carbondale.....	17	17	237	217	20				
Carlinville.....	76	76	275	236	39				
Carlyle.....	53	78	230	204	26				
Carmi.....	13	13	27	27					
Carpenterville.....	2	8	407	376	26	5		5	1.3
Carrollton.....	21	21	76	46	30				
Carthage.....	55	61	164	143	21				
Carey.....	3	3	7	7					
Casey.....	21	21	70	43	27				
Cedar Point.....	5	5	8	8					
Centralla.....	51	53	1,334	1,049	283	2		2	.1
Champaign.....	255	261	4,381	2,803	1,569	9		9	.2
Charleston.....	46	46	377	248	127	2		2	.5
Chenoa.....	1	1	148	87	61				
Cherry.....	1	1	5	4		1		1	.20.
Cherry Valley.....	8	8	14	13	1				
Chester.....	17	17	77	77					
Chillicothe.....	1	1	67	48	19				
Chrisman.....	8	8	31	23	9				
Christopher.....	12	12	166	166					
Cisna Park.....	3	3	15	15					

TABLE NO. 3—Continued.

City or town.	Number of establishments.	Number of inspections.	Number of employees.						Per cent of children to total employed.
			Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.	Total under 16.	
Clayton.....	15	15	31	29	1	1		1	3.2
Claytonville.....	2	2	4	4					
Coffeen.....	1	1	2	1	1				
Colchester.....	10	14	43	38	5				
Columbia.....	7	7	124	124					
Collinsville.....	69	83	1,174	1,035	64	56	19	75	6.4
Cornell.....	4	4	6	6					
Cordova.....	1	1	14	4	10				
Coulterville.....	6	6	17	15	2				
Crescent City.....	2	2	3	3					
Creston.....	3	3	3	3					
Cres.....	2	2	8	8					
Cuba.....	7	7	18	10	8				
Dallas City.....	22	26	107	65	12				
Danville.....	132	143	6,327	5,500	814	13		13	2
Davis.....	2	2	9	9					
Davis Junction.....	2	2	23	23					
Decatur.....	101	211	4,069	3,175	817	49	28	77	1.8
DeKalb.....	138	177	3,508	3,039	469				
Dekota.....	3	3	6	6					
DePue.....	5	5	1,032	1,025	7				
Dewfield.....	1	1	90	90					
Dicky.....	1	1	1	1					
Dixon.....	28	44	643	340	286	8	9	17	2.6
Downers Grove.....	4	4	28	28					
Dundee.....	4	4	37	35		2		2	5.4
DuQuoin.....	29	29	832	825	4	3		3	4
Durand.....	11	11	18	16	2				
Dwight.....	12	12	67	67					
Earlville.....	15	20	57	44	12	1		1	1.8
East St. Clair.....	1	1	7	7					
East St. Louis.....	222	234	4,586	4,232	343	20	1	21	5
Edwardsville.....	69	69	264	218	46				
Emingham.....	39	43	243	183	60				
Elburn.....	8	8	35	35					
Eldorado.....	4	4	105	105					
Elgin.....	52	73	2,542	1,480	1,028	7	27	34	1.4
Elizabeth.....	5	5	11	8	3				
Ellicott.....	2	2	3	3					
Elmhurst.....	1	1	65	65					
El Paso.....	11	12	137	102	35				
Eola.....	1	1	18	13	5				
Erie.....	16	16	41	28	10	3		3	7.3
Eureka.....	13	13	226	168	58				
Evansville.....	1	1	4	4					
Eyas.....	1	1	2	2					
Fairbury.....	20	20	74	74					
Fairdale.....	5	5	7	7					
Fairfield.....	42	47	494	195	298	1		1	2
Farina.....	5	9	22	10	12				
Farmington.....	99	107	214	149	63	2		2	9
Federal.....	2	2	521	520	1				
Flora.....	25	25	224	190	34				
Flannigan.....	5	5	12	12					
Franklin Grove.....	5	5	8	8					
Freebury.....	5	5	43	43					
Freeport.....	62	75	528	405	114	7		7	1.3
Forrester.....	10	10	18	18					
Fort Sheridan.....	1	1	1	1					
Fulton.....	10	10	391	344	47				
Galena.....	53	53	514	362	151	1		1	2
Galesburg.....	237	259	2,910	2,299	595	16		16	5
Galva.....	68	80	432	396	36				
Garden Prairie.....	4	4	14						
Geneseo.....	64	75	439	357	81	1		1	2
Geneva.....	1	1	55	5	45		5	5	9.1
Genoa.....	19	19	188	141	42	1	4	5	2.7
Georgetown.....	5	5	14	6	8				
Gilberts.....	1	1	16	16					
Gibson City.....	20	20	414	299	107	6	2	8	1.9
Gillespie.....	41	41	135	111	24				
Girard.....	32	32	102	86	16				
Glasford.....	9	9	35	35					

TABLE NO. 3—Continued.

City or town.	Number of establishments.	Number of inspections.	Number of employees.						Per cent of children to total employed.
			Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.	Total under 16.	
Glenridge.....	1	1	39	39					
Goodenow.....	1	1	2	2					
Goodwin.....	1	1	2	2					
Grand Ridge.....	11	16	20	20					
Granite City.....	32	32	117	79	38				
Grant Park.....	4	4	8	8					
Granville.....	13	13	29	27	2				
Granwood.....	1	1	2	2					
Graymount.....	1	1	3	3					
Grayslake.....	6	6	44	44					
Grayson.....	1	1	19	19					
Greenfield.....	9	9	26	17	9				
Greenup.....	16	16	59	41	18				
Greenville.....	102	102	863	562	317	2	2	4	.5
Greenwood.....	1	1	2	2					
Gridley.....	24	24	58	58					
Griggsville.....	2	2	9	8	1				
Gurnee.....	2	2	3	3					
Hamilton.....	26	30	108	101	7				
Hampshire.....	1	1	9	8	1				
Hanover.....	10	10	165	136	57	1	1	2	1.2
Harrisburg.....	21	21	317	317					
Hartland.....	1	1	18	18					
Harvard.....	23	23	355	299	55	1		1	.3
Harvel.....	1	1	2	2					
Hebron.....	1	1	4	4					
Henry.....	55	67	147	133	13			1	.7
Herrin.....	16	16	128	71	53	3	1	4	3.1
Herscher.....	2	2	4	4					
Highland.....	6	6	57	36	21				
Highland Park.....	44	55	317	188	129				
Highwood.....	8	8	29	28	1				
Hillsboro.....	100	100	952	895	57				
Hinckley.....	7	7	22	15	7				
Hoopeston.....	2	2	588	477	111				
Huntley.....	2	2	9	9					
Ipava.....	2	2	2	2					
Irwin.....	1	1	3	3					
Jacksonville.....	326	362	4,263	3,133	1,114	12	4	16	.4
Jerseyville.....	31	31	383	261	122				
Johnson City.....	20	20	112	67	45				
Joliet.....	164	169	3,285	2,390	877	11	7	18	.5
Jonesboro.....	7	7	37	31	6				
Kane.....	1	1	15	5	10				
Kankakee.....	39	39	1,466	595	839	18	14	32	2.1
Kansas.....	5	5	18	9	9				
Keithsburg.....	15	15	96	91	5				
Kentwood.....	1	1	3	3					
Kewanee.....	132	144	2,892	1,896	917	55	24	79	2.7
Kincaid.....	1	1	18	18					
Kingston.....	6	6	13	12	1				
Kinmundy.....	12	12	39	23	16				
Kirkland.....	9	9	33	27	6				
Knoxville.....	34	38	101	84	16	1		1	1
Lacon.....	58	65	278	191	80	4	3	7	2.5
Ladd.....	3	3	53	53					
LaHarpe.....	10	10	33	23	10				
Lake Forest.....	30	30	197	146	51				
Lake Villa.....	5	5	10	10					
LaMoille.....	6	6	21	12	9				
Lanark.....	1	1	40	30	10				
LaSalle.....	156	188	2,586	2,095	428	61	2	63	2.4
Lawrenceville.....	45	45	612	545	66	1		1	.2
Leaf River.....	3	3	6	6					
Leeds.....	1	1	2	2					
Leland.....	2	2	5	5					
Lena.....	14	14	33	25	8				
Lenox.....	1	1	50	50					
Leonara.....	6	6	8	8					
Leroy.....	1	1	109	101	68				
Lewistown.....	13	13	48	26	22				
Libertyville.....	8	8	110	110					
Lincoln.....	23	23	201	84	115	2		2	1.

TABLE NO. 3—Continued.

City or town.	Number of establishments.	Number of inspections.	Number of employees.						Per cent of children to total employed.
			Total.	Males over 16.	Fe-males over 16.	Boys 14 to 16.	Girls 14 to 16.	Total under 16.	
Lisbon Center	1	1	2	2	..	..	..	..	..
Litchfield	118	118	720	625	92	3	..	3	4
Livingston	7	7	21	12	9	..	..	..	..
Lostant	7	7	10	8	1	1	..	1	10.
Mackinaw	19	19	58	47	10	1	..	1	1.7
Macomb	54	65	683	590	93	..	..	..	..
Magnolia	1	1	1	1	..	..	..	..	..
Malta	6	6	16	8	8	..	..	..	..
Manteno	1	1	75	75	..	..	..	..	..
Maple Park	1	1	13	13	..	..	..	..	..
Marengo	14	14	81	50	31	..	..	..	..
Marion	35	35	245	158	89	..	..	..	..
Marselles	7	7	76	73	..	3	..	3	3.9
Marshall	22	22	96	65	31	..	..	..	..
Martinsville	13	13	53	36	17	..	..	..	..
Matherville	2	2	33	33	..	..	..	..	..
Mattoon	56	56	1,399	1,164	234	1	..	1	1
Maurrie	1	1	2	2	..	..	..	..	..
Maxwell	1	1	13	13	..	..	..	..	..
McConnell	4	4	8	8	..	..	..	..	..
McLeansboro	16	16	40	40	..	..	..	..	..
McNab	1	1	1	1	..	..	..	..	..
Mendota	42	54	228	159	66	1	..	1	4
Meriden	2	2	4	4	..	..	..	..	..
Metamora	5	5	11	7	4	..	..	..	..
Metropolis	8	8	104	104	..	..	..	..	..
Milford	16	16	306	262	44	..	..	..	..
Millbrook	1	1	2	2	..	..	..	..	..
Mellington	1	1	3	3	..	..	..	..	..
Mill Shoals	2	2	16	6	10	..	..	..	..
Mineral	2	2	10	10	..	..	..	..	..
Minook	34	56	194	178	16	..	..	..	..
Minooka	3	3	9	8	1	..	..	..	..
Moline	32	52	1,616	951	644	11	10	21	1.2
Momence	2	2	57	37	..	..	..	..	..
Monroe	8	9	9	9	..	..	..	..	..
Montgomery	5	2	354	338	16	..	..	..	..
Mooseheart	2	2	185	163	22	..	..	..	..
Morris	77	97	753	627	119	5	2	7	9
Morrison	27	27	362	304	57	1	..	1	3
Morrisonville	29	29	81	77	4	..	..	..	..
Morton	27	27	161	139	21	1	..	1	6
Mound City	8	8	414	321	93	..	..	..	..
Mounds	2	2	2,030	2,019	11	..	..	..	..
Moweaqua	41	41	105	94	11	..	..	..	..
Mt. Carmel	73	84	1,071	884	183	2	2	4	4
Mt. Morris	5	5	9	9	..	..	..	..	..
Mt. Olive	40	40	166	130	34	2	..	2	1.2
Mt. Sterling	15	15	63	40	23	..	..	..	..
Mt. Vernon	58	60	289	155	115	7	12	19	6.6
Mulberry Grove	19	19	45	41	4	..	..	..	..
Murphysboro	99	99	1,433	1,131	289	1	12	13	9
Nashville	14	14	59	59	..	..	..	..	..
National Stock Yards	6	6	2,243	1,961	280	2	..	2	1
Nelson	2	2	25	25	..	..	..	..	..
Neoga	14	14	50	36	14	..	..	..	..
Neola	1	1	3	3	..	..	..	..	..
Neponset	2	2	5	5	..	..	..	..	..
NeRoma	1	1	1	1	..	..	..	..	..
Nevada	1	1	2	2	..	..	..	..	..
New Athens	7	7	150	145	5	..	..	..	..
New Boston	10	10	24	21	3	..	..	..	..
New Lebanon	1	1	2	2	..	..	..	..	..
Newton	42	50	147	101	44	2	..	2	1.4
New Windsor	1	1	2	2	..	..	..	..	..
Noble	19	21	141	83	57	1	..	1	7
Nora	1	1	2	2	..	..	..	..	..
Normal	19	22	87	68	16	3	..	3	3.4
Norris	2	2	3	3	..	..	..	..	..
North Anna	1	1	30	30	..	..	..	..	..
North Chicago	34	40	1,817	1,503	306	7	1	8	4
Oakland	13	13	53	29	22	1	1	2	3.8
Oblong	2	2	9	9	..	..	..	..	..

TABLE NO. 3—Continued.

City or town.	Number of establishments.	Number of inspections.	Number of employees.					Total under 16.	Per cent of children to total employed.
			Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.		
Odell.....	8	8	22	22					
Odin.....	11	11	90	58	28	2	2	4	4.4
O'Fallon.....	2	2	207	207					
Oglesby.....	10	10	830	800	29	1		1	.1
Ohio.....	9	9	25	17	8				
Olney.....	71	78	441	318	123				
Onarga.....	1	1	411	320	91				
Oneida.....	17	17	43	43					
Orangeville.....	9	9	22	19	3				
Oregon.....	2	2	4	4					
Orion.....	8	8	19	15	4				
Oswego.....	4	4	7	7					
Ottawa.....	50	42	304	148	153	3		3	1.
Pana.....	117	117	226	140	85	1		1	.4
Panola.....	1	1	1						
Paris.....	69	69	820	567	248	3	2	5	.6
Paxton.....	23	25	144	121	19	4		4	2.8
Pearl City.....	6	6	16	11	5				
Pecatonica.....	32	36	160	134	26				
Pekin.....	80	88	2,876	2,655	219	2		2	.1
Peoria.....	861	950	15,318	11,838	3,354	70	56	126	.8
Percy.....	2	2	29	29					
Perry Springs.....	1	1	2	2					
Peru.....	66	71	5,721	4,213	1,404	68	36	104	1.8
Petersburg.....	1	1	45	15	30				
Petersville.....	2	2	4	4					
Pinckneyville.....	13	13	40	26	11	3		3	7.5
Pingree Grove.....	6	6	20	20					
Pittsfield.....	14	14	58	29	29				
Plainfield.....	7	8	43	38	5				
Plano.....	27	31	143	83	60				
Plate Center.....	1	1							
Polo.....	9	9	14	14					
Pontiac.....	29	33	454	283	167	3	1	4	.9
Poplar Grove.....	5	5	28	27	1				
Preempton.....	2	2	6	6					
Princeton.....	109	109	430	361	69				
Prophetstown.....	9	9	41	32	9				
Prospect Heights.....	2	2	5	5					
Rawson.....	1	1	4	4					
Ravinia.....	1	2	21	11	10				
Ravinia Park.....	1	2	32	30	2				
Red Bud.....	7	7	47	47					
Red Oak.....	1	1	2	2					
Reynolds.....	1	1	2	2					
Ridott.....	2	2	4	3	1				
Roadhouse.....	13	13	143	120	23				
Roanoke.....	4	4	11	8	3				
Robinson.....	52	62	253	221	62				
Rochelle.....	12	13	54	53	1				
Rock City.....	5	5	11	11					
Rock Falls.....	24	26	789	732	55	2		2	.8
Rockford.....	99	127	4,852	3,697	1,120	27	8	35	.7
Rock Island.....	41	48	1,211	366	816	7	22	29	2.4
Rockton.....	6	6	43	41	2				
Romeo.....	1	1	62	62					
Rossville.....	1	1	118	96	22				
Round Grove.....	1	1	2	2					
Rushville.....	13	13	42	32	10				
Rutland.....	13	13	30	23	7				
Salem.....	34	38	186	107	77		2	2	1.1
Sandoval.....	7	8	118	114	4				
Sandwich.....	24	32	441	397	44				
Savanna.....	1	1	412	412					
Scales Mound.....	4	4	9	7	2				
Seneca.....	7	10	26	19	6	1		1	3.8
Shabbona.....	8	8	19	11	8				
Shawneetown.....	9	9	17	17					
Shelfield.....	3	3	29	29					
Shelbyville.....	95	95	217	165	51	1		1	.5
Sheldon.....	10	10	18	18					
Sherrard.....	8	8	29	28	1				
South Beloit.....	16	17	767	557	210				

TABLE NO. 3—Concluded.

City or town.	Number of establishments.	Number of inspections.	Number of employees.					Total under 16.	Per cent of children to total employed.
			Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.		
South Freeport.....	1	1	1	1					
Sollett.....	1	1	2	2					
Sparland.....	7	7	17	17					
Spring Valley.....	3	3	21	15	3	3		3	1.4
Springfield.....	458	506	8,350	5,915	2,407	27	1	28	1.3
Sparta.....	15	15	224	223	1				
Staunton.....	72	72	219	188	28	3		3	1.4
Steelville.....	1	1	3	3					
Sterling.....	28	28	192	65	125	2			2.1
Stewardson.....	1	1	9	9					
St. Francesville.....	16	16	47	35	12				
Stillman Valley.....	2	2	5	5					
Stockdale.....	2	2	13	13					
Stockton.....	16	16	101	87	14				
Streator.....	327	372	7,974	6,495	1,431	18	30	48	.6
Sublette.....	5	5	8	8					
Sullivan.....	26	26	82	50	32				
Sycamore.....	74	94	754	543	211				
Tamaroa.....	6	6	75	75					
Tamms.....	1	1	65	65					
Tampico.....	7	7	21	11	10				
Taylor Ridge.....	2	2	4	4					
Taylorville.....	42	245	1,107	657	449	1		1	.1
Tiskilwa.....	18	18	45	36	9				
Tonica.....	9	9	14	14					
Toulon.....	12	12	39	29	10				
Tower Hill.....	39	39	90	77	13				
Trenton.....	4	4	48	48					
Tuscola.....	28	28	110	62	48				
Union.....	5	5	39	34	5				
Urbana.....	32	32	641	554	87				
Utica.....	18	21	144	131	13				
Van Orin.....	1	1	2	2					
Vermont.....	9	9	21	18	3				
Vienna.....	3	3	4	4					
Villa Grove.....	3	3	181	178	3				
Viola.....	1	1	1	1					
Virdeu.....	57	57	175	148	27				
Waddams.....	2	2	5	5					
Walnut.....	4	4	7	7					
Warren.....	9	9	42	34	8				
Warrensburg.....	1	1	161	126	35				
Warsaw.....	43	54	439	369	70				
Washburn.....	5	5	75	69	6				
Washington.....	20	20	314	144	170				
Waterloo.....	14	14	92	92					
Watseka.....	18	18	41	41					
Watterman.....	8	8	40	40					
Waukegan.....	198	201	3,512	3,048	462	4		4	.1
Waverly.....	39	39	56	52	4				
Wedron.....	2	4	31	30	1				
Wenona.....	7	7	17	17					
West Chicago.....	1	1	30	30					
Wheaton.....	1	1	76	76					
Whitehall.....	12	12	179	162	17				
Wilbern.....	2	2	10	10					
Wilmington.....	3	3	19	9	10				
Winchester.....	45	45	85	66	19				
Winnebago.....	7	7	10	10					
Winslow.....	7	7	20	18	2				
Woodhull.....	1	1	3	3					
Woodland.....	4	4	37	37					
Woodstock.....	11	13	1,329	1,184	145				
Wyandot.....	9	9	23	16	7				
Wyoming.....	5	5	14	9	5				
Yorkville.....	20	22	68	42	26				
Zearing.....	1	1	1	1					
Ziegler.....	1	1	53	53					
Zion City.....	14	14	384	186	198				
Total.....	11,513	12,714	179,034	139,576	38,051	828	579	1,407	.7

In 92 of the 391 cities and towns children under 16 years of age were found at work. Of these 92 towns 40 showed an equal or higher percentage of child labor than that for the entire State, viz:

City or town.	Per cent.	Children.	City or town.	Per cent.	Children.
Alton	1.2	51	Kewanee	2.7	79
Arcola	1.3	1	Lacon	2.5	7
Aurora	3.1	267	LaSalle	2.4	63
Carpenterville ...	1.2	5	Lostant	10.	1
Cherry	20.	1	Mackinaw	1.7	1
Clayton	3.2	1	Marseilles	3.9	3
Collinsville	6.4	75	Moline	1.2	21
Decatur	1.8	77	Mt. Olive	1.2	2
Dixon	2.6	17	Mt. Vernon	6.6	19
Dundee	5.4	2	New Lebanon ...	1.4	2
Earlville	1.8	1	Normal	3.4	3
Elgin	1.4	34	Oakland	3.8	2
Erie	7.3	3	Odin	4.4	4
Freeport	1.3	7	Paxton	2.8	4
Geneva	9.1	5	Peru	1.8	104
Genoa	2.7	5	Pinckneyville ...	7.5	3
Gibson City	1.9	8	Rock Island	2.4	29
Hanover	1.2	2	Seneca	3.8	1
Herrin	3.1	4	Spring Valley ...	1.4	3
Kankakee	2.1	32	Staunton	1.4	3

The following tabulation shows the total number of "age and school certificates" or working permits issued by the board of education of the city of Chicago:

Year.	Number of certificates issued.
July 1, 1908, to June 30, 1909.....	12,538
July 1, 1909, to June 30, 1910.....	14,244
July 1, 1910, to June 30, 1911.....	Missing
July 1, 1911, to June 30, 1912.....	13,313
July 1, 1912, to June 30, 1913.....	12,583
July 1, 1913, to June 30, 1914.....	13,633
July 1, 1914, to June 30, 1915—Boys, 6,924; girls, 3,919.....	10,843

The Catholic parochial issuing office of the city of Chicago granted the following number of working permits:

Year.	Number of certificates issued.
Jan. 1, 1910, to Dec. 31, 1910.....	5,743
Jan. 1, 1911, to Dec. 31, 1911.....	Missing
Jan. 1, 1912, to Dec. 30, 1912.....	5,464
Jan. 1, 1913, to Dec. 30, 1913.....	2,292
July 1, 1913, to June 30, 1914.....	5,363
July 1, 1914, to June 30, 1915.....	4,296
July 1, 1915, to June 30, 1916.....	5,112

On account of failure to send duplicate certificates we are unable to supply the number of "age and school certificates" issued by the public schools outside of Chicago, the Lutheran parochial schools for the entire State, and the Catholic parochial schools outside of Chicago.

RESULTS OF INSPECTIONS ACCORDING TO THE PROVISIONS OF THE HEALTH, SAFETY AND COMFORT LAW.

This act was originally enacted July, 1909, effective January 1, 1910. During the summer of 1914 this department instituted legal

proceedings against a manufacturing concern, because it refused to comply with certain orders for the installation of protective devices, as called for by this law. The defense set up that the law was unconstitutional, because of some irregularity between the Senate and House Journals of 1909. While we doubted that any court would hold the law unconstitutional on a technicality, we followed the principle of "Safety-First" and asked the Forty-ninth General Assembly to re-enact the same, which it did.

The gist of this law is what its title indicates. It provides for the health, safety and comfort of wage-earners in mercantile establishments, mills, factories, and workshops in this State.

A synopsis of its provisions follows:

1. All power driven machinery shall be so located as not to be dangerous to employees and shall be properly protected at all hazard points, especially at point of work. Dangerous places of passage or employment must be effectively fenced in. No machine known to be dangerously defective is to be used and repairs must not be made while machinery is in motion.

2. Safeguards must not be removed, except for repairs.

3. Means for disconnecting power in case of accident must be provided.

4. Hoistways and elevator wells must be enclosed and passenger or freight elevators must be constructed in such a manner that in the event of an accident the cab can be prevented from falling.

5. Notice to remedy unsafe conditions must be complied with after a reasonable time.

6. Machines must not be operated or tampered with by a person unfamiliar with the machine.

7. Traversing carriages of self-acting machinery must not run within 18 inches of any part of the building.

8. Food must not be eaten in rooms where it may become contaminated by poisonous substances or gases due to the process of manufacture and employees must leave such rooms during meal hours.

9. A reasonable number of suitable seats must be provided for female employees.

10. A reasonable and equable temperature must be maintained in workrooms and no unnecessary humidity shall be permitted.

11. All workrooms having less than 2,000 cubic feet of air space but more than 500, must install artificial ventilation and furnish during such months of the year as the outside temperature requires windows to be kept closed, 1,500 cubic feet of fresh air per hour per employee.

All rooms where the outside windows and door space is less than one-eighth of the floor space must furnish artificial ventilation throughout the year to the extent of 1,800 cubic feet of fresh air per hour per employee.

All rooms having less than 500 cubic feet of air space must furnish artificial ventilation throughout the year to the extent of 1,800 cubic feet of fresh air per hour per employee.

12. Workrooms must be kept free from gasses or effluvia from sewers, drains, and other nuisances. If the process of manufacture creates poisonous fumes, gases or dust they must be removed by exhaust devices.

13. All decomposed matter, refuse, and sweepings must be removed from workrooms daily and no cleaning shall be done during working hours. Where on account of the process floors are wet, dry standing room must be provided for employees.

14. Means of escape in case of fire must be provided, and shall remain unobstructed and must be plainly marked.

15. Exits must be provided with doors that open outward, and constructed so that they can be easily opened from within.

16. Stairways must be provided with hand rails and safe treads.

17. Sufficient and proper lights must be kept burning in main passageways, hallways, stairways, landings, shafts, in front of all passenger and

freight elevators, and on the entrance floors and other floors during every work day of the year.

18. Floors must not be overloaded with machinery or materials beyond the safe sustaining power of the floors or walls.

19. Spacing of machinery must not cause a menace and passageways must be of sufficient height and width, clear of obstructions and well lighted.

20. Water-closets must be easily accessible and provided in the proportion of one to every thirty males and one to every twenty-five females, separate and apart for each sex and plainly marked, properly lighted, disinfected, and ventilated to the outside air.

21. Adequate washing facilities must be provided.

22. The employer must make the necessary changes and additions and the owner of the building must permit the alterations.

23. Orders for changes and equipments issued by the Chief Factory Inspector must be completed within a reasonable time.

24. Accidents involving the loss of 15 consecutive days' time must be reported to the Chief State Factory Inspector between the 15th and 25th of each month, but all deaths must be reported immediately.

The remaining clauses of the law provide for the enforcement of the act, penalties for violations and the printing of wall notices, which must be posted in offices and workrooms, and which cover the salient features of the law.

The following table presents the number of inspections made while enforcing the provisions of the "Health, Safety and Comfort Law" and gives the number and kinds of orders issued to correct defective or dangerous conditions.

TABLE NO. 1—COMPARATIVE STATISTICS OF THE RESULTS OF INSPECTIONS ACCORDING TO THE HEALTH, SAFETY AND COMFORT LAW.

For the years July 1, 1914, to June 30, 1915 and July 1, 1915, to June 30, 1916.

Location.	Year.	Number of establishments inspected.	Number of employees.			Number of items in orders complied with.	Number of orders mailed.	Number of items in orders issued pertaining to—					
			Total.	Males.	Females.			Building.	Sanitation.	Power.	Dangerous machinery.	Dangerous machinery parts.	Number of items in orders issued.
Chicago and Cook County..	1915-16	4,230	92,498	74,654	17,844	22,139	.....	1,541	1,653	2,202	768	10,080	16,284
	1914-15	4,074	117,333	82,464	34,868	17,444	2,651	1,766	1,652	2,269	719	10,963	17,599
Outside of Chicago and Cook County	1915-16	3,747	78,707	68,603	10,104	15,375	.....	1,799	839	2,400	448	10,582	16,068
	1914-15	2,878	105,239	95,510	9,729	11,685	1,039	1,597	1,156	2,754	1,133	15,053	21,608
Total for entire State.	1915-16	7,977	171,205	143,257	27,948	37,514	.....	3,340	3,492	4,602	1,211	20,612	32,342
	1914-15	6,952	222,571	177,974	44,597	29,129	3,690	3,363	2,808	5,023	1,852	26,036	39,207

A total of 7,977 establishments were inspected in the entire State for the purpose of enforcing the provisions of this law. As a result of these inspections it was found necessary to issue official orders involving the safe-guarding of 32,342 danger points. The orders are classified into five groups pertaining to defects of the factory or mill building, to insufficient sanitation, to control of power transmission apparatus, to the guarding of dangerous machinery, and to the elimination or guarding of dangerous machinery parts.

In Cook County, 4,230 establishments were inspected which received orders to safeguard 16,284 items of hazard. One thousand five hundred forty-one of these items called for the repair of buildings, 1,653 for sanitary equipment, 2,292 for installation of power transmission, 768 for guarding of dangerous machines, and 10,030 for protective devices of dangerous parts on machinery.

Outside of Cook County 3,747 manufacturing plants or shops were inspected and orders issued to render 16,058 items of a hazardous character safe. Fifteen thousand three hundred seventy-five of these were complied with, as was ascertained on reinspection. Factories in cities and towns outside of Cook County were notified to safeguard 1,799 items pertaining to the buildings, in 829 instances sanitary equipments were unsatisfactory or lacking, power transmission had to be controlled in 2,400 cases, while 443 items referred to the safeguarding of dangerous machines, and 10,582 to dangerous machinery parts.

Table No. 2, herewith appended, details the number of establishments inspected in each town outside of Cook County, together with the number of orders issued to bring unsafe conditions up to the standard and shows the number of men and women employed.

TABLE NO. 2.

City or town.	Number of inspections.	Number of orders issued.	Number of employees—		
			Total.	Males.	Females.
Abingdon.....	2	6	13	13	.....
Agnew.....	1	5	2	2	.....
Albion.....	2	15	3	3	.....
Aledo.....	9	46	41	38	4
Alton.....	32	523	4,709	3,748	961
Amboy.....	2	4	81	80	1
Anna.....	5	34	99	97	2
Annawan.....	2	12	15	5	.....
Antioch.....	3	18	10	10	.....
Apple River.....	2	9	4	4	.....
Arcola.....	1	4	4	4	.....
Area.....	1	4	3	3	.....
Arthur.....	3	24	16	16	.....
Ashkum.....	2	56	5	4	1
Ashley.....	1	8	8	7	1
Ashton.....	4	18	5	5	.....
Assumption.....	3	11	9	9	.....
Astoria.....	4	18	15	13	2
Augusta.....	1	6	2	2	.....
Aurora.....	66	747	6,481	5,598	889
Barry.....	5	15	12	11	1
Batavia.....	12	118	452	407	45
Beecher.....	4	72	16	16	.....
Belleville.....	21	98	1,006	988	18
Belmont.....	1	29	3	3	.....
Beloit.....	5	64	280	259	21
Belvidere.....	4	15	48	45	3
Blackstone.....	1	4	2	2	.....
Blandinsville.....	5	23	13	11	2
Bloomington.....	14	92	2,090	1,956	134
Bluffs.....	1	4	9	9	.....
Bradley.....	6	132	325	308	17
Braidwood.....	1	6	50	49	1
Breese.....	6	22	15	15	.....
Bridgeport.....	4	22	18	15	3
Brookport.....	2	17	12	12	.....
Bryce.....	1	21	3	3	.....
Buckingham.....	3	6	7	7	.....
Buckley.....	1	14	2	2	.....
Buda.....	7	46	48	46	2
Bunker Hill.....	1	3	2	2	.....
Bushnell.....	5	34	81	77	4

TABLE NO. 2—Continued.

City or town.	Number of inspec- tions.	Number of orders issued.	Number of employees—		
			Total.	Males.	Females.
Byron.....	2	11	6	6	.....
Caberry.....	2	52	4	4	.....
Cairo.....	12	115	345	327	18
Caledonia.....	2	11	9	9	.....
Cambridge.....	2	47	38	29	9
Carbondale.....	3	11	12	11	1
Carlinville.....	4	19	26	26	.....
Carlyle.....	7	66	158	151	7
Carmi.....	5	46	31	24	7
Carrier Mills.....	1	7	26	26	.....
Carrollton.....	2	6	6	5	1
Cedar Point.....	1	3	1	1	.....
Champaign.....	6	25	63	49	14
Charleston.....	2	5	19	19	.....
Chebanse.....	3	35	9	9	.....
Cherry Valley.....	3	20	6	6	.....
Chester.....	6	26	59	59	1
Chicago, Burlington & Quincy R. R.....	2	6	82	81	1
Christopher.....	6	66	232	223	.....
Cissna Park.....	3	24	15	15	.....
Clayton.....	8	64	13	13	.....
Claytonville.....	2	22	4	4	.....
Clifton.....	2	80	12	12	.....
Cofton.....	1	2	3	3	1
Colchester.....	1	1	4	3	1
Collinsville.....	19	98	1,520	1,344	176
Columbia.....	2	61	112	112	.....
Cornell.....	4	17	7	7	.....
Coulterville.....	3	29	12	11	1
Crescent City.....	2	23	3	3	.....
Creston.....	4	16	5	5	.....
Crete.....	2	20	8	8	.....
Dallas City.....	6	32	25	22	3
Danforth.....	2	48	6	6	.....
Danville.....	5	23	132	121	11
Davis.....	3	9	15	15	.....
Decatur.....	46	981	5,853	4,741	612
DeKalb.....	3	67	437	346	91
DeKola.....	3	26	6	6	.....
Delrey.....	2	40	4	4	.....
DePue.....	2	39	1,083	1,061	2
Dickey.....	1	14	1	1	.....
Dixon.....	2	5	8	8	.....
Downers Grove.....	2	29	10	10	.....
Duquoin.....	6	55	150	148	2
Durand.....	5	22	10	10	.....
Dwight.....	4	22	10	10	.....
Earlville.....	4	9	16	8	8
East St. Louis.....	126	897	7,590	7,251	339
Edwardsville.....	4	59	71	71	.....
Emingham.....	2	14	49	26	23
Elburn.....	4	53	37	37	.....
Eldorado.....	1	8	30	30	.....
Elgin.....	3	91	419	231	188
Elizabeth.....	2	16	4	4	.....
Elliott.....	2	16	3	3	.....
ElPaso.....	6	22	38	34	4
Erie.....	4	12	6	5	1
Eureka.....	4	17	10	8	2
Eylar.....	1	13	2	2	.....
Fairbury.....	9	66	47	45	2
Fairdale.....	3	7	10	10	.....
Farmington.....	2	8	4	4	.....
Federal.....	2	21	450	448	2
Felanagan.....	3	20	8	8	.....
Flora.....	2	9	12	9	3
Forrest.....	1	7	34	33	1
Forreston.....	3	22	7	7	.....
Franklin.....	5	25	11	10	1
Freeburg.....	5	146	43	43	.....
Freeport.....	49	336	2,271	1,946	325
Fulton.....	2	21	9	7	2
Galena.....	2	15	8	8	.....
Galesburg.....	25	90	462	423	39
Galva.....	11	87	373	291	82
Garden Prairie.....	1	2	3	3	.....

TABLE NO. 2—Continued.

City or town.	Number of inspections.	Number of orders issued.	Number of employees—		
			Total.	Males.	Females.
Gault.....	1	6	2	2	.....
Geneva.....	2	46	149	80	69
Genoa.....	7	40	149	115	34
Georgetown.....	1	3	5	5	.....
Glasford.....	1	4	3	3	.....
Glenridge.....	1	15	39	39	.....
Gibson City.....	9	65	73	46	27
Gilman.....	4	49	8	8	.....
Gillespie.....	2	8	12	12	.....
Goodenow.....	1	21	4	1	3
Goodwine.....	1	11	2	2	.....
Girard.....	1	4	2	2	.....
Grand Ridge.....	3	8	7	4	3
Grant Park.....	5	65	133	132	1
Granville.....	7	40	18	16	2
Graymont.....	1	5	3	3	.....
Grays Lake.....	3	15	114	105	9
Greenfield.....	3	9	5	5	.....
Greenville.....	7	22	29	27	2
Griggsville.....	2	6	9	8	1
Gurnee.....	1	10	10	10	.....
Hamilton.....	4	16	41	40	1
Hanover.....	1	5	180	126	54
Harrisburg.....	4	28	70	70	.....
Harvard.....	6	31	250	242	8
Henry.....	6	22	21	19	2
Herrin.....	2	8	12	6	6
Herschel.....	2	48	5	5	.....
Highland Park.....	2	12	74	30	44
Highwood.....	1	11	7	6	1
Hillsboro.....	3	8	57	35	2
Hinckley.....	3	17	10	10	.....
Irwin.....	3	54	9	6	3
Jacksonville.....	13	68	654	498	161
Jerseyville.....	13	65	598	351	247
Johnston City.....	1	3	3	2	1
Joliet.....	50	588	7,694	7,256	438
Joy.....	1	3	1	1	.....
Kankakee.....	16	315	721	224	497
Kelthsburg.....	4	24	67	66	1
Kempton.....	3	65	6	6	.....
Kentland.....	1	6	4	1	3
Kewanee.....	20	130	754	464	290
Kingston.....	2	13	7	7	.....
Kinmundy.....	1	3	16	4	12
Kirkland.....	3	21	22	20	2
Lacon.....	6	48	155	91	64
Ladd.....	2	12	6	6	.....
LaHarpe.....	6	18	27	27	.....
Lake Villa.....	2	10	5	5	.....
LaMoille.....	2	8	3	3	.....
LaSalle.....	4	11	76	65	11
Lawrenceville.....	7	52	80	71	9
Leaf River.....	3	18	6	6	.....
Leeds.....	1	3	2	2	.....
Leland.....	3	18	8	8	.....
Lena.....	6	39	21	15	6
Lenore.....	3	14	4	4	.....
Lenox.....	1	2	50	50	.....
Lewiston.....	4	20	10	8	2
Libertyville.....	3	16	12	11	1
Lisbon Center.....	1	3	2	2	.....
Litchfield.....	7	27	290	290	.....
Loda.....	2	57	5	5	.....
Lostant.....	2	9	4	4	.....
Lovington.....	2	16	4	4	.....
Macomb.....	26	152	512	454	58
Magnolia.....	1	4	2	2	.....
Malta.....	2	15	4	4	.....
Manville.....	1	4	2	2	.....
Maple Park.....	1	9	13	13	.....
Marengo.....	2	5	8	6	2
Marion.....	3	17	40	40	.....
Marseilles.....	2	10	8	5	3
Marshall.....	1	6	6	6	.....
Matherville.....	2	25	33	33	.....

TABLE NO. 2—Continued.

City or town.	Number of inspec- tions.	Number of orders issued.	Number of employees—		
			Total.	Males.	Females.
Mattoon.....	25	98	909	872	37
Meriden.....	2	9	4	4	.....
Metamora.....	4	15	9	8	1
Metropolis.....	5	14	87	86	1
Millford.....	3	19	7	7	.....
Millbrook.....	1	12	2	2	.....
Millington.....	1	8	3	3	.....
Mineral.....	2	17	10	10	.....
Minonk.....	7	31	57	53	4
Minooka.....	2	20	7	7	.....
Moline.....	1	5	411	398	12
Momence.....	5	68	47	47	.....
Monroe Center.....	1	4	4	4	.....
Montgomery.....	2	10	307	298	9
Morris.....	9	86	182	128	34
Morrison.....	4	15	12	11	1
Morrisonville.....	7	42	25	24	1
Morton.....	1	10	21	20	1
Mound City.....	2	6	159	68	91
Mcwaequa.....	3	16	9	6	3
Mt. Carmel.....	7	88	514	507	3
Mt. Morris.....	2	8	7	4	2
Mt. Olive.....	3	18	27	27	.....
Mt. Sterling.....	6	27	16	14	2
Mt. Vernon.....	4	25	30	17	13
Mulberry Grove.....	4	36	10	10	.....
Murphysboro.....	8	42	49	42	7
McConnell.....	1	4	3	3	.....
McLeansboro.....	3	41	16	15	1
McNabb.....	1	8	2	2	.....
Nashville.....	6	63	73	72	1
National Stock Yards.....	8	324	3,661	3,443	218
Nelson.....	2	19	14	14	.....
New Lebanon.....	3	14	49	34	15
Noble.....	2	7	2	2	.....
North Chicago.....	2	52	272	249	23
Oblong.....	2	10	9	9	.....
Odell.....	4	49	14	14	.....
Odin.....	2	13	26	26	.....
O'Fallon.....	2	47	207	207	.....
Oglesby.....	2	13	408	401	7
Olney.....	4	19	44	17	27
Onelda.....	1	11	6	6	.....
Ottawa.....	9	52	122	113	9
Otto.....	1	12	3	3	.....
Paxton.....	2	16	32	25	7
Peoria.....	31	586	2,998	2,846	152
Perdueville.....	2	16	4	4	.....
Peru.....	9	49	1,777	1,085	692
Pingree.....	1	6	1	1	.....
Pingree Grove.....	1	12	11	11	.....
Plato Center.....	1	16	5	5	.....
Polo.....	8	27	23	15	8
Pontiac.....	5	43	107	104	3
Prophetstown.....	4	17	10	9	1
Rauson.....	1	5	4	4	.....
Red Bud.....	2	22	21	21	.....
Robinson.....	6	50	48	46	2
Rochelle.....	3	11	25	23	2
Rockford.....	5	210	939	922	18
Round Grove.....	1	6	2	2	.....
Roundout.....	1	33	38	35	3
Rutland.....	3	14	8	8	.....
Sandoval.....	2	15	54	54	.....
Seneca.....	1	2	7	7	.....
Shabbona.....	2	13	4	4	.....
Shawneetown.....	1	3	2	2	.....
Sheldon.....	2	17	6	6	.....
Solletta.....	1	21	2	2	.....
Sparta.....	2	8	5	4	1
Springfield.....	2	2	20	20	.....
St. Anne.....	5	100	61	60	1
St. Charles.....	1	31	50	50	.....
St. Elmo.....	1	4	75	15	60
St. Francisville.....	2	10	6	6	.....
Sterling.....	9	183	300	287	13

TABLE NO. 2—Concluded.

City or town.	Number of inspections.	Number of orders issued.	Number of employees—		
			Total.	Males.	Females.
Stillman Valley.....	3	15	6	6	.....
Streator.....	12	50	706	571	135
Sublette.....	2	9	3	3	.....
Tamaroa.....	3	25	71	70	1
Tamms.....	1	15	65	65	.....
Tampico.....	2	14	5	4	1
Tonica.....	3	11	3	3	.....
Trenton.....	4	73	49	45	4
Union.....	1	6	2	2	.....
Union.....	3	30	73	69	4
Vienna.....	1	3	4	2	2
Waldron.....	1	18	2	2	.....
Warsaw.....	4	13	126	118	8
Waterloo.....	7	115	95	94	1
Waukega.....	6	37	14	14	.....
Waterman.....	3	20	7	7	.....
Waukegan.....	12	148	494	389	105
Wedron.....	1	4	3	3	.....
Wheaton.....	1	3	76	76	.....
Woodland.....	2	18	3	3	.....
Woodstock.....	1	97	1,460	1,370	80
Ziegler.....	1	35	53	53	.....

Table No. 3 analyzes the orders issued for the installation of safeguards or corrections of defective conditions to owners of establishments located in and outside of Cook County according to the five main classifications, which in turn are subdivided into fifty-seven points of hazard.

TABLE NO. 3—ANALYSIS OF ALL ORDERS.

July 1, 1915, to June 30, 1916.

Classification of orders.	City and Cook County.	State outside Cook County.	Total.
I. Building—			
1. Exits and fire escapes.....	30	21	51
2. Doors, slide and roll.....	18	19	37
3. Stair treads.....	65	63	128
4. Handrails and toeboards.....	551	787	1,338
5. Openings in floors.....	97	106	203
6. Elevators, automatic gates and slant boards.....	296	185	481
7. Elevator cars.....	280	466	746
8. Safety devices.....	.....	3	3
9. Proper light.....	85	23	108
10. Heating system.....	.....	2	2
11. Passageways and obstructions.....	94	86	180
12. Dangerous places.....	25	38	63
	1,541	1,799	3,340
II. Sanitation—			
1. Toilets.....	766	538	1,304
2. Washing and dressing rooms, etc.....	543	103	646
3. Seat for females.....	31	17	48
4. Proper ventilation.....	23	6	29
5. Remove dust and fumes.....	223	44	267
6. Rooms clean, dry and sanitary.....	38	5	43
7. Install or guard fans and blowers.....	25	52	77
8. Guard ovens, furnaces, vats, pans, etc.....	9	64	73
	1,653	829	2,482
III. Power—			
1. Engine stops or disengaging devices.....	120	227	347
2. Signal systems.....	39	26	65
3. Belt shifters.....	246	92	338
4. Boiler and engine room.....	171	168	339
5. Clutches, couplings and weights.....	543	156	699

TABLE NO. 3—Concluded.

Classification of orders.	City and Cook County.	State outside Cook County.	Total.
III. Power—Concluded.			
6. Switches and throttles.....	22	30	52
7. Dynamos and motors.....	31	23	54
8. Electric appliance and wiring.....	100	74	174
9. General orders.....	1,008	1,586	2,590
10. Eccentrics and crank shafts.....	4	7	11
11. Miscellaneous.....	13	16	29
	<u>2,292</u>	<u>2,405</u>	<u>4,697</u>
IV. Dangerous machinery—			
1. Hydro extractors.....	37	15	52
2. Mangles, metal rolls, drums, crushers and tumblers.....	40	56	96
3. Band saws.....	189	75	264
4. Circular saws.....	314	118	432
5. Planers.....	13	6	19
6. Shapers.....	25	23	48
7. Jointers.....	80	41	121
9. Sticklers and mortisers.....	46	12	58
10. Trip hammers, bulldozers and shears.....	9	21	30
11. Printing presses.....	6	3	9
12. Looms, spindles and shuttles.....	6	73	79
	<u>768</u>	<u>443</u>	<u>1,211</u>
V. Dangerous machinery parts—			
1. Flywheels.....	933	1,153	2,086
2. Punch and drill presses at point of work.....	171	42	213
3. Planer and shaper beds under platen.....	73	126	199
4. Pipe machines and turret lathes.....	20	15	35
5. Gears.....	2,010	2,021	4,031
6. Belts and pulleys.....	4,920	4,850	9,770
7. Sprocket and chains, also screw conveyors.....	237	450	687
8. Shafting and roll bearings.....	695	632	1,327
9. Exposed set screws and bolt keys.....	582	1,021	1,503
10. Emery wheels.....	371	265	636
11. Cranes.....	15	4	19
12. Cutters, feather and leather splitters.....	3	3	6
	<u>10,090</u>	<u>10,582</u>	<u>20,612</u>
Total.....	<u>16,284</u>	<u>16,058</u>	<u>32,342</u>

The orders issued by this department on the fifty-seven points enumerated in the several preceding tables are thus explained with greater detail.

BUILDINGS.

Exit Facilities.—Sufficient exit facilities of a safe and dependable type should be provided, to enable all the occupants of a building to leave it quickly in case of fire. All buildings more than one story in height should have at least two exits from each story, placed at opposite ends of the building or otherwise separated in such manner that they cannot both be cut off by fire. The different types of exits to be maintained in good condition are horizontal exits, smoke-proof towers, cut off stair shafts, interior stairs, outside stairs (fire escapes), elevators, chutes, outside ladders, individual fire escapes, and poles for sliding. It is essential that fire escapes have substantial hand rails and treads, that stairway platforms are provided at all floors, and that the counterbalanced swinging steps operate without danger.

All exits should be properly marked as exits, and the doors of same should open outward. Lights of adequate strength should be provided at all doorways and exits. Whenever possible, it is advisable to have the exit lighting system independent of the other lighting supply.

Doors should be so constructed that they will easily swing outward, slide, or roll.

Stairways should be easily accessible. Circular stairs should be abandoned and steep stairways should be abolished. The combined riser and tread should be about $7\frac{1}{2}$ inches, a good combination being 6 to 7-inch risers and $10\frac{1}{2}$ inch to $11\frac{1}{2}$ -inch treads.

Stair treads should be repaired frequently or supplied with a non-slip material, such as carborundum or alundum. Checkered or roughened surfaces of iron or steel plates are serviceable. Abrasive crystals embedded in concrete stairs make secure footing possible.

Hand rails should be installed as follows:

1. On open side or sides of unenclosed stairways.
2. On one side of enclosed stairways less than 3 feet in width.
3. On both sides of enclosed stairways 3 feet or more in width.

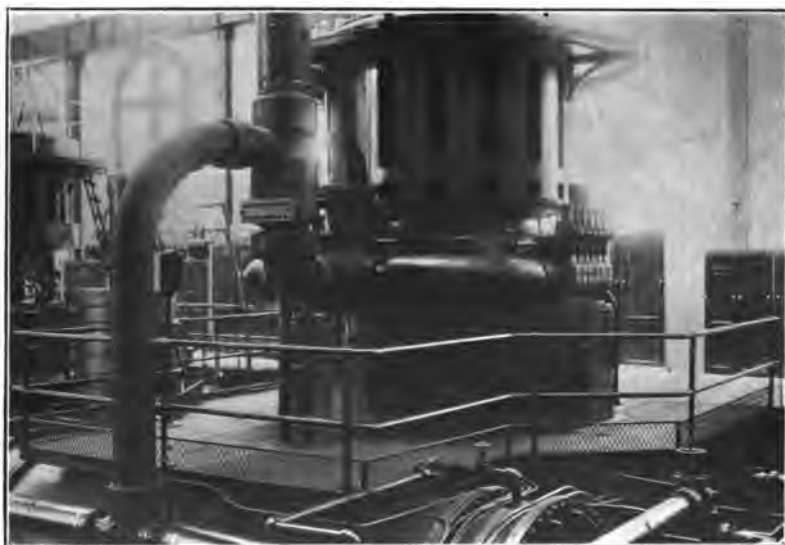


Figure 1. Platform, double rail and toeboard.

4. On both sides and in centre of stairways over 8 feet in width.

Handrails should be smooth and free from nails, bolts, or splinters and placed about three inches from the wall.

Toeboards should be provided on all elevated platforms, balconies and runways, also at stairway landings and floor openings. Railings of substantial type should be provided around such openings and platforms. A 6-inch toeboard is ordinarily adequate, but in some cases it is desirable to enclose the space between the platform and the middle rail with sheeting or woven wire. Toeboards prevent tools from falling off and injuring people below. In gas plants or blast furnaces, where persons are liable to be overcome by gas, they will prevent rolling off of balconies and platforms. Platforms and walkways with handrails should be built over all dangerous passageways. See figure 1.

Floor openings should be provided with permanent railing; where these are impracticable, portable or removable railings may be substituted. Small openings should be protected by means of suitable covers, which should be hinged or otherwise permanently attached, to prevent their complete removal. It is often possible to equip such covers with rest-rods, which support the cover at such an angle as will permit easy access from the open end, but still form a barrier at the three unused sides. Rails and covers should be provided around and over all ovens, furnaces, vats, forges, pans, etc.

Overloading of floor or other parts of a building structure may occur through the installation of machinery, tanks, or other fixtures which are too heavy to give an adequate factor of safety for the members which must carry the load; or through the accumulation of heavy stock of material during the ordinary course of manufacture.

Elevators are a constant source of danger. Both passenger and freight elevators should be equipped with some device to hold it in suspension in case of falling. The shaftways should be inclosed to a proper height to prevent persons, tools or materials from falling down the shaft. Riding on freight elevators by any other person than the regular employee should be prohibited. Freight elevators should be equipped with automatic wire-mesh tops. Every freight elevator must be provided with automatic or semi-automatic gates. The semi-automatic gates are preferred. Where there is not sufficient clearance to admit of standard gates being used, a gate of two or three telescoping sections can sometimes be satisfactorily installed. Floor projections should be beveled and covered with sheet metal to prevent crushing foot as car descends. All freight elevators must be provided with cable locks, so that they cannot be started while loading or unloading by persons on other floors. The elevator cab should be inclosed on all sides, except the entrance, to a height of 5 feet. In mercantile establishments and other buildings passenger elevators should be equipped with a mechanical interlocking door device. (See illustrations pages 89-93.)

Obstructions in halls and passageways, on stairs and fire escapes must be avoided.

SANITATION.

Toilets must be provided for employees in all factories, mills, mercantile establishments and workshops in the proportion of one to every 30 males and one to every 25 females. Toilets for male and female employees must be located separate and apart from each other, properly inclosed and the doors must be plainly marked to indicate the sex. Toilet rooms must be adequately lighted and kept in a sanitary condition and disinfected at regular intervals.

Washing and dressing rooms containing adequate facilities and sufficient room to accommodate the respective number of employees must be installed in every factory, mercantile establishment, and workshop. Provisions for dressing and washing may be provided for in one room, but separate rooms of this kind must be maintained for each sex.

Dining rooms must be kept and placed at the disposal of employees in such factories, where dangerous and poisonous substances are used in the process of manufacture, such as lead in paint factories, soldering in can factories, smelting of lead and zinc, and other harmful processes

in other industries. Strict shop discipline must be observed and no employees should be permitted to eat in a workroom.

Seats for females must be provided and the use of same permitted at all such times, when it will not materially interfere with their work. Seats should be installed in mercantile houses in the proportion of 2 seats for each three females.

When artificial means of ventilation are required, the air supply must be taken from the outside of the building, not less than 20 feet from the ground. Taking the air from cellars or basements is absolutely prohibited.

Air washing and humidifying often is necessary. An apparatus for this purpose consists of a chamber containing spray nozzles or wash-



Figure 2. Properly ventilated core room, core ovens equipped with hoods.

ers, through which the air passes before it is admitted to the building which is being ventilated. The washing process is of value in that it eliminates dust or dirt which is generally present in the air, particularly in manufacturing plants. By maintaining suitable temperatures in the air heating and washing apparatus, the humidity may be regulated to suit varying atmospheric conditions. In summer, when the humidity is relatively great, the water in the washer is kept at a temperature considerably below that of the atmosphere; the warm outside air entering the washer is chilled below the "dew point," so that the excess moisture is condensed and thus removed.

In winter the process is reversed; the cool outside air, which is relatively dry, is heated before it enters the washer; this raises the temperature but lowers the relative humidity. Moisture is then absorbed as the air passes through the washer, after which it is again heated and enters the room, containing sufficient moisture for the requirements of health.

Dust, acid fumes, and noxious or explosive vapors should be removed by means of artificial suction furnished by a mechanically operated exhaust system. The intakes of this system should be placed as close as possible to the source of the dust or fumes, so as to prevent the latter from becoming diffused. The discharge of harmful or dangerous fumes or vapors should be at a point where it will do no injury. See figure 2.

Clean and dry rooms must be maintained in all buildings for the health and comfort of employees.

POWER.

Quick-stopping devices to shut off the power are of vital importance when a man is caught in machinery. Belt shifters or clutches for the

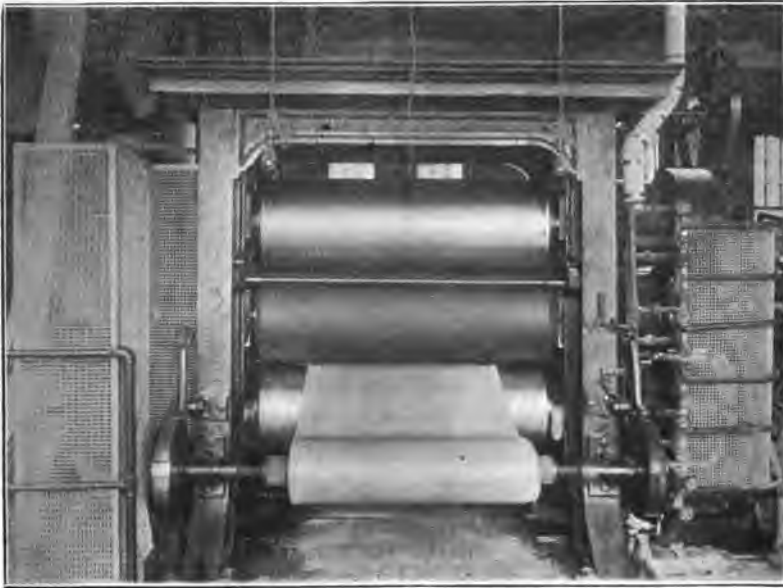


Figure 3. Rolls in rubber factory, drive enclosed engine stop within easy reach.

individual machines are not sufficient. Means must be provided in each room on each floor for shutting off the power supply to any room and stopping all shafting and counter-shafting in it without delay. Automatic engine stops, quick-closing valves, clutches, tight and loose pulleys are some of the devices which may be used and are readily adaptable to various kinds of service. See figure 3.

Flywheels must be provided with a railing at least $3\frac{1}{2}$ feet high and if it extends into a pit, a toeboard at least 6 inches in height shall be provided along any exposed edges of pit. See figures 4 and 5. Where railing is used it should be covered with sheet metal or wire mesh. For rope sheaves the guard should consist of strong material, either sheet metal or wire mesh, so as to leave no exposed parts around which a breaking rope might wrap.

Water glasses on steam boilers should be constructed of wired glass and the lowest visible part must not be less than 2 inches above the lowest permissible water level.

Belt shifters, where tight and loose pulleys are used on power driven machinery, must be provided and placed within easy reach of the operator.

Signal devices must be installed on elevators or in engine rooms in case warning to shut down engines must be given to the engineer.

Clutches with exposed toggles and couplings with exposed bolts, must be inclosed.

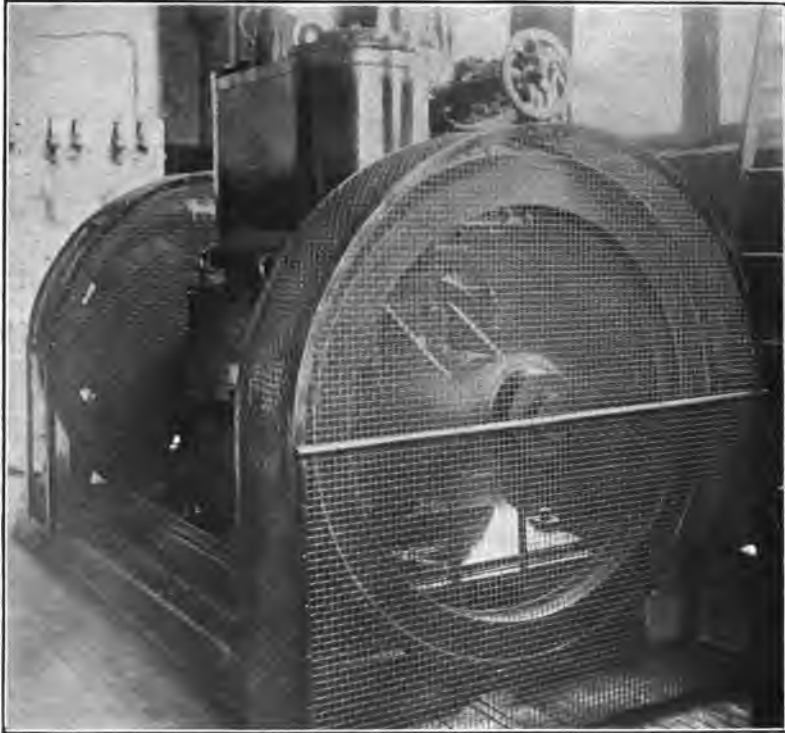


Figure 4. Westinghouse engine flywheel enclosed.

Eccentrics and crank shafts being hazardous must be guarded.

Switches on motors and throttles on engines must be within easy reach of operators.

Motors and dynamos cause shocks and should have rubber or wooden matting on the floor, where men must walk.

Electrical wiring should be laid in conduits and well-taped at connections.

DANGEROUS MACHINERY.

Hydro extractors should be equipped with covers interlocking with the driving mechanism in such a way that the cover cannot be lifted

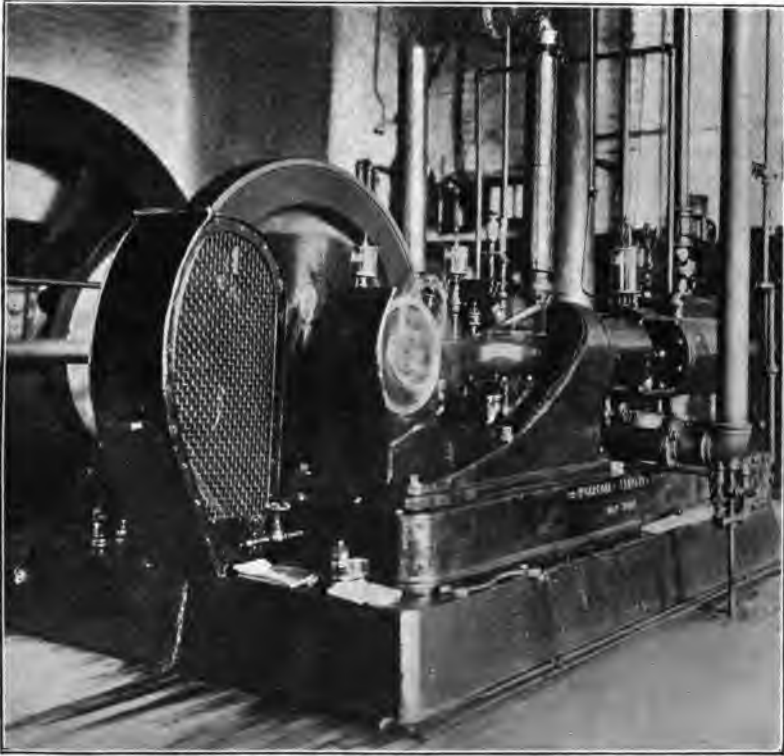


Figure 5. Wire mesh guard around compressor flywheel.



Figure 6. Tumblers or rattlers enclosed with guard open and closed.

while the machine is running, and the machine cannot be started without the cover in place.

Mangles and rolls must be provided with finger guards.

Drums, crushers, and tumblers must be inclosed. See figure 6.

Looms, spindles, and shuttles must be properly guarded.

Saws of every description must be guarded. The guards must be constructed to cover every hazardous point without obstructing the point of work.

Planer knives must be effectively inclosed.

Shapers, jointers, and stickers must be adequately guarded.

Bulldozers and shears must be properly guarded at point of work.

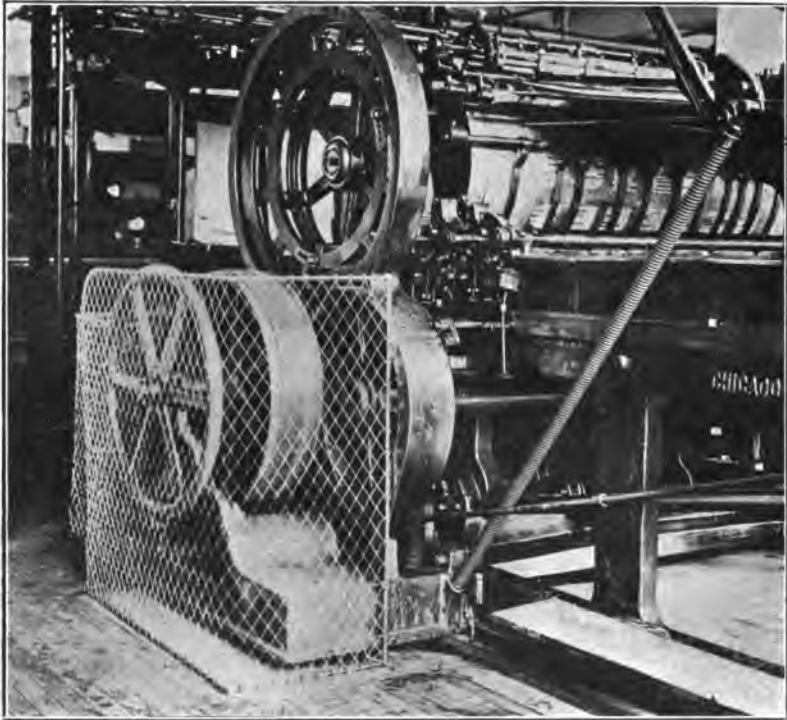


Figure 7. Miehle press flywheel and belt enclosed.

Trip hammers must be provided with treadle locks.

Printing presses possess many danger points. Flywheels on presses must be provided with discs. Miehle presses must have toeguards. See figure 7.

Punch presses must have guards at point of work, or be provided with some effective interlocking device or buttons which engage the operator's hands, keeping them out of the danger zone when the plunger is tripped.

Emery wheels should be provided with heavy metal guards. Spindle ends must not project beyond the nuts.

DANGEROUS MACHINERY PARTS.

Revolving shafting, pulleys, and couplings, are dangerous and means of protection should be provided around them. Each one of these items in turn involve further hazards by reason of projecting parts on them, such as set screws, bolt-heads, keys and protrusions. These should be countersunk or covered so as to render them safe. Unused portions of keyways should be filled in such a manner as to present a perfectly smooth surface. See figure 8.

Vertical and inclined shafts should be encased to a height of 6 feet from the floor, or provided with a standard railing on unprotected sides, located at least 15 inches horizontally from centre line of shaft.

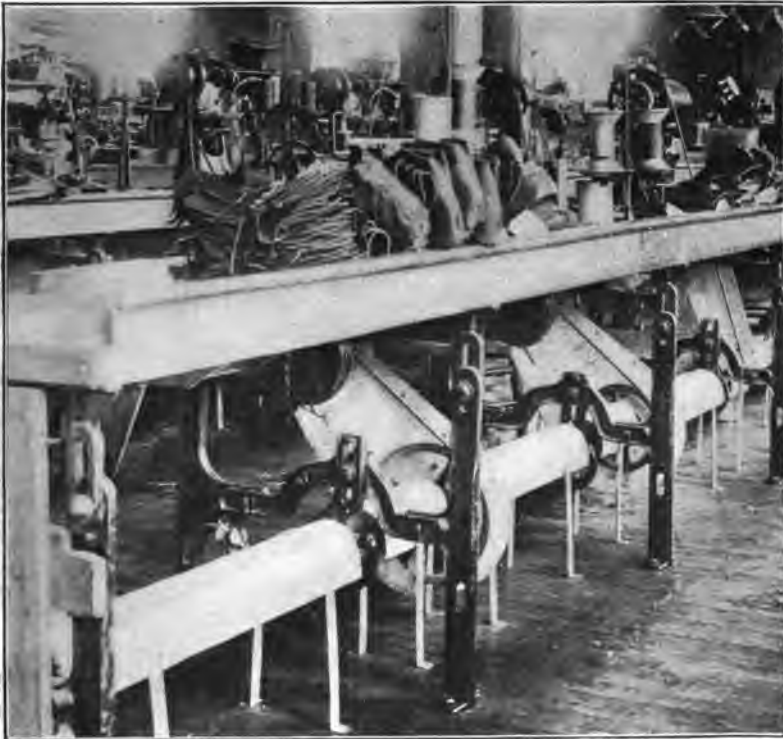


Figure 8. Sewing machine shaft and pulleys enclosed.

Horizontal shafting, not more than 6 feet above floors, platforms, etc., should be encased, or protected on all exposed sides by standard railing.

Projecting shaft ends one or more inches in length should be cut off, equipped with protective cups or casings, or provided with guards as specified for shafting.

Belts and pulleys more than seven feet above floors, platforms, etc., should have a suitable guard placed immediately underneath the belt, the guard to be of substantial construction, securely fastened in place

and carried up around pulley receiving downward travel of belt to ceiling, beam, or other support, in order to prevent a breaking belt from catching on end of guard.

In the case of overhead belts seven inches or more in width the floor space underneath the belt must be railed off or otherwise blocked against passage—railed space to extend 15 inches beyond belt at both sides and at the ends to extend beyond either pulley to a point where a line 45° from the vertical projected from center of pulley would touch the floor; this space not to be used for storage or other purposes.

Belts and pulleys seven feet or less above floors must have substantial guards constructed around them to a height of 5½ feet from the

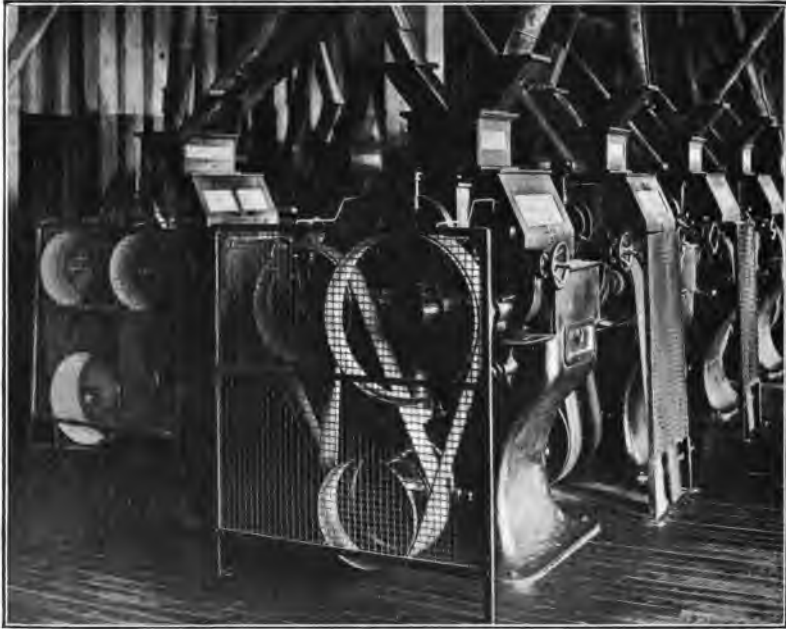


Figure 9. Flour mill. Roll mills with drives guarded.

floor. Clearance between running belt and exposed edge of guard shall be not less than 6 inches. See figures 9 and 10.

Passageways through belts, where there is space between upper and lower parts of a belt, must be completely enclosed on all sides exposed to breaking belt, and on top (also at bottom if belt is exposed there), shall be constructed as shown in Illustration No. 36, page 98; Twenty-second Annual Report, otherwise such space must be completely barred against passage.

Ropes and sheaves must have same protection as belts and pulleys, except that all enclosures must be of solid construction or sheeted over, in order to prevent a breaking rope from causing damage. See figure 11.

Sprocket wheels and chains must be protected in the same manner as belts and pulleys.

Gears, unless so located that accidental contact with them is impossible, shall be wholly inclosed, or have a band guard around face of gear with side flanges extending inward beyond root of teeth. The only safe gear is one which is so enclosed or guarded as to make accidental contact with it impossible. The danger is, of course, greater in some cases than in others; where gears run "out" and where the mesh point is inaccessible, the hazard may be so slight that it can be disregarded, unless a shear is formed between the teeth of the gear and some adjacent



Figure 10. Flour mill. Exposed roll mill drive.

member. Accidents may thus occur, even on gears, running "out," and loose clothing, hair of women operators, etc., are liable to be caught. See figures 12 and 13.

Splitting, cutting, skiving, and clicking machines can readily be provided with guards, which will prevent danger of fingers being carried into the rolls or knives. The guards should be so arranged that the opening underneath will provide for the smallest practicable clearance.

Planer-beds under platen shall be substantially covered with cast-iron or steel plate.

Lathe dogs, or lathe chucks, should have no projecting set screws.

Turret lathes and pipe machines must be equipped with a guard for feed stock.

Drills. Wherever possible, counterweights should be placed inside the vertical columns of drill press. Where this cannot be done, a guard or enclosure shall be provided, to retain the weight in case the support-

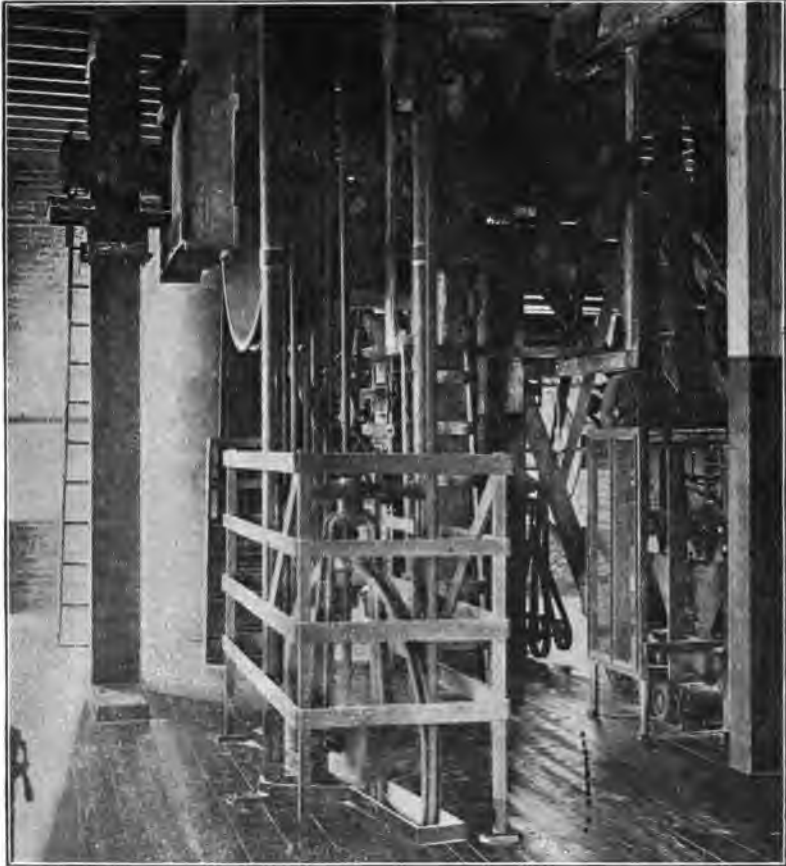


Figure 11. Flour mill. Rope and cable drive guarded.

ing chain or rope should break. The belts of multiple-spindle drills shall be guarded across the front, where a breaking belt might endanger the eyes of the operator if unguarded.

Crane wheel guards of steel plate or forgings, shall be placed at least 18 inches in front of each of the bridge truck and trolley wheels; these fenders to extend down on each side at least one inch below head of rail, and to be rigidly secured in position 18 inches in front of wheel to prevent danger of crushing a man's hand on rail.

Circular saws, hand saws, swing saws, wood jointers, stickers, planers, shapers, matchers, tenoning machines, handle lathes, sanders, and other woodworking machinery should have cutting numbers, feed rolls and other moving parts which might cause injury, guarded as completely as the character of the work will permit. Where long pieces of wood are handled, a machine with automatic feed can be used, in which case the danger is greatly reduced. It is well to provide a bar or other suitable guard in front of the feed roll of these machines, to

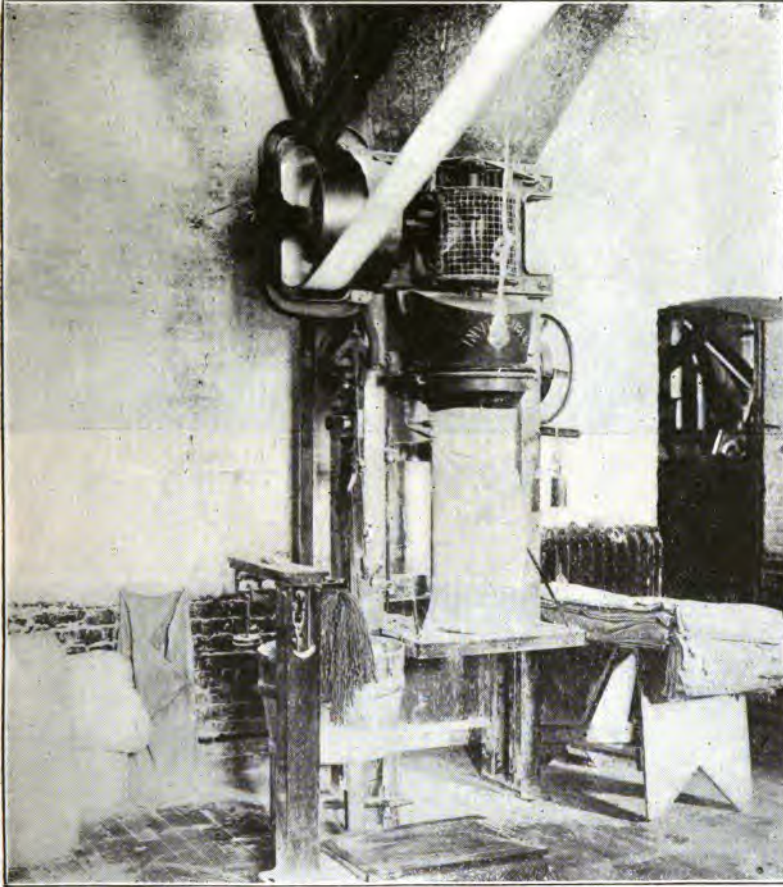


Figure 12. Flour mill. Sack filler bevel gears guarded.

prevent fingers being caught between the roll and the entering piece. Planing or sawing of small pieces of wood should never be done by hand, but with a holder provided with handles for gripping them. See figure 14.

Provisions must be made on all saw guards to prevent injury by reason of "kick back" due to saw striking knot or other obstruction in stock.



Figure 13. Lathe gear guard open.



Figure 14. Self feed rip saw with kick back guard and automatic feed.

SAFETY MUSEUM.

It has been the intention of this department to show employers and plant managers concrete examples of safety work by the maintenance of a permanent exhibit, displaying models of safety devices for dangerous machinery, exhaust systems, sanitary washroom equipments, photographs and sketches, as well as blueprints. One section of the exhibit is devoted to the study of occupational diseases. This section contains a complete collection of various poisonous substances used in the industries of this State and samples of proper clothing outfits as protective measures for men engaged in dusty and poisonous trades.

This exhibit, the only one of its kind in this State and the only one maintained by any State, contains the following:

Guards for Dangerous Machinery.

Wire belt guard, 3 different types.	Belt shifter, working model.
Grip nuts.	Elevator automatic safety door lock, working model.
Jointer guard, 3 different types.	Elevator cable rope lock, working model.
Punch press guard, 4 different types, working models.	Trip hammer guard, working model.
Shaper guard, working model.	Safety dogs, 4 exhibits.
Automatic engine stop, working model.	Friction clutch, working model.
Planer guard, working model.	Countersunk set screws, 2 types.
Circular saw guard, 5 different types, working models.	Water gauge guard, 2 different types, working models.
Band saw guard, working model.	

Devices for Structural Work.

Painter's scaffold, model.	Safety rope net, model.
Tuckpointer's scaffold, model.	Metal hose, exhibit.
Safety caisson device, model.	

Wash Room Equipment.

Disinfecting machines, 4 different types.	Water closet with high water tank, model.
Drinking fountain, model.	Liquid soap containers, 2 types.
Shower bath, model.	Drinking cup holder.
Enameled 6 foot trough with 6 hot and cold spigots, model.	

Metal Polishing Devices.

Models of wheels, suction pipes, fan and dust collector.	Emery wheels, 2 types, working models.
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Other Exhibits.

Safety acid bottle carrier, model.	Safety collars, exhibits.
Safety ladder, model.	Time clocks, 2 types.
Safety stair treads, model.	

Photographs.

306 views of guarded and unguarded machinery in connection with the requirements of the "Health, Safety and Comfort Law."	25 views illustrating wash room equipments as demanded by the "Wash House Law."
104 views of safety devices and improved working conditions in the building trades, as required by the "Structural Safety Law."	17 views pertaining to the garment trades.
54 views relating to devices and conditions in connection with the "Occupational Disease Law."	16 views on child labor conditions.
	6 views of metal polishing shop facilities in connection with the "Blower Law."
	5 views of types of "First Aid Rooms."

The department desires the public to make use of this exhibit and invites visitors to call between the hours of 9 a. m. and 5 p. m., Saturdays from 9 a. m. to 12 noon.

CHEMICAL TOILETS.

According to section 20 of the "Health, Safety and Comfort Law" this department orders the installation of toilet facilities in factories and workshops.

When these shops, factories, and mills are located within the limits of incorporated towns usually little difficulty is experienced in obtaining compliance with these orders.



Figure 15.

A serious and perplexing problem arises, however, when a factory or mill is situated a great distance from a sewer or no sewage system has ever been built in the town.

In most instances of this kind out-houses or privies are erected at varying distances from the factories or mills. Even with the best of care these out-houses are unsanitary and a nuisance.

Especially the men engaged in heated occupations, such as foundry-men, stockers, etc., find it a hardship and a danger to their health to be



Figure 16.

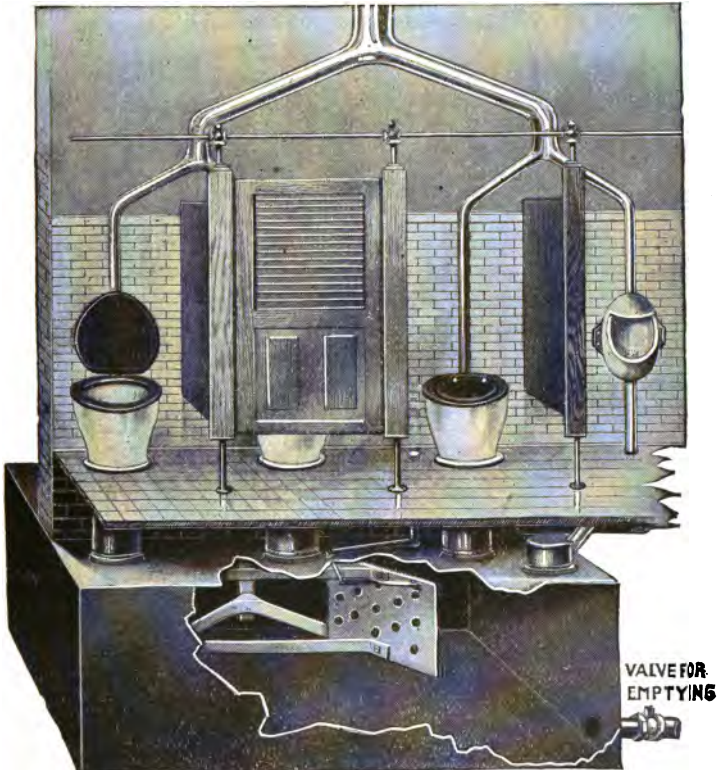


Figure 17.

compelled to cover a distance of a hundred feet or more during the cold winter months in reaching these out-houses. When these men leave the shop they are soaked with perspiration and have a high body temperature.

Knowing the discomfort and danger to his health, the average workman in these occupations prefers to neglect himself.

Recognizing this situation the department feels that it has solved the problem by the introduction of chemical toilets now on the market and which can be installed at one-fourth the cost of the water flush type.

Chemical toilets consist of a bowl, a tank, and a powerful germicide. The bowl is of special hopper shape so that the excretions fall directly into the vault, as shown in the accompanying illustration. No water is required for flushing the bowl. The solid matter and paper are completely disintegrated, liquefied, and sterilized by means of a strong chemical used in the tank. This chemical is a white powder practically odorless, which is dissolved in three or four pails of water before placing in the tank. The water used in dissolving the chemical is all that is required to operate the outfit. When the vault becomes full it is emptied by turning a valve shown at the end, and the sewage allowed to run into an ordinary tile drain or pit from where it seeps into the ground the same as water.

The chemical used is a disinfectant and possesses eighteen times the germ killing power of carbolic acid.

The smaller illustration shows the portable type of chemical closet and can readily be installed, where the work is only temporary.

The third cut shows a multiple system with urinal and illustrates the method of installation, where a large number of employees must be accommodated.

ELEVATORS.

Elevator accidents are numerous, too numerous to be passed over lightly.

The "Health, Safety and Comfort Law" aims to lessen these accidents by several excellent safety provisions. It often happens that the hoisting machinery breaks, permitting both passenger and freight elevators to fall to the bottom of the shaft. To provide against such a contingency the law demands that every elevator must be equipped with some device, which will hold the cab and prevent it from falling.

The tops of freight elevators must be covered with wire mesh, constructed in sections, capable of holding any object which may fall on it from one of the floors above. A hinged section not less than 18 inches from the front is to be hinged on the top cross beam, to allow it to swing upwards in case of meeting with obstruction. It is particularly important that the wall between the bottom of the door at each floor and the top of the door of the next floor below be flush, with no beams, sills, or thresholds projecting outward from it. If such projections exist, they should be carefully guarded. Two drawings here reproduced show the methods of installing elevator tops. Design "A" shows the top frame of a small freight elevator with the screen sections removed. It will be noticed that the tie rod facing the front of the car is set back not less than 18 inches from the front, permitting the wire mesh section, which is hinged to the top cross beam, to swing upwards in case of meeting

with an obstruction. The woven wire section should be made of No. 10 wire one inch mesh to prevent small material from falling into the car from above. Where the materials are larger No. 9 wire with an inch and a half mesh will be approved by this department.

Design "B" shows a larger elevator. The method of attaching and placing the hinged section is similar to the method shown in design "A."

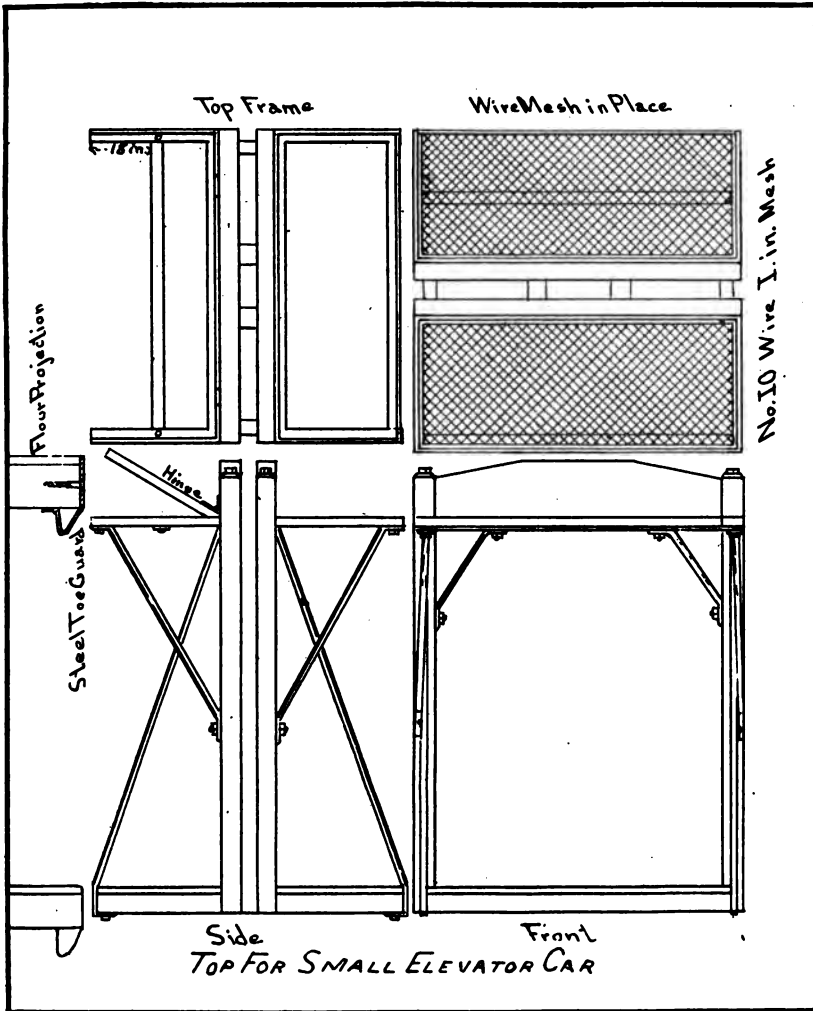


Figure 18. Design "A."

Attention is further directed to the ease with which as many sections as are necessary to cover the entire top of the car, may be installed.

At each floor projection, a smooth, sloping shield, preferably of steel, or waxed maple, set with its upper edge flush with the outer extremity of the projection, and sloping to the wall below at an angle of sixty degrees. Every guard of this kind should be of sufficient length

and of sufficiently gradual slope, to push a person's foot into the car instead of permitting it to become crushed. Another illustration shows the results of an accident. A truck fell three stories through open door. Wire mesh canopy, which had been installed upon order of this department, saved the men on the elevator from injuries and possible death.

The sides of elevators should be enclosed to prevent any part of a person's body or any material on the car from projecting into the shaft.

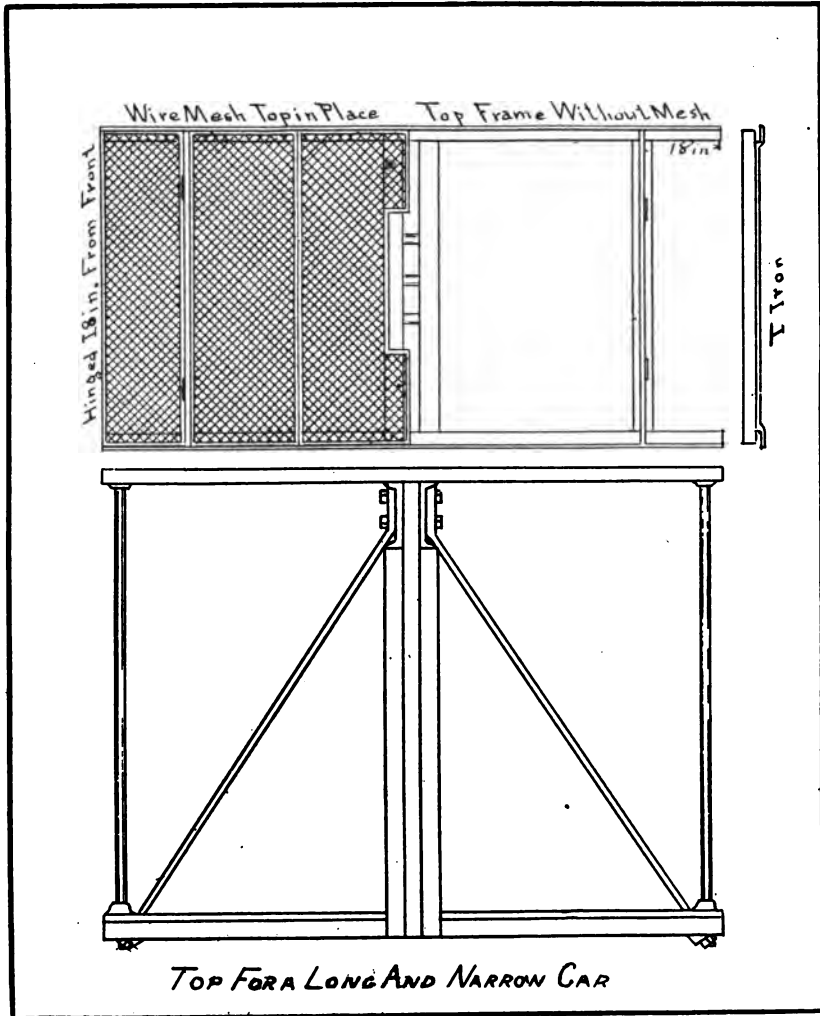


Figure 19. Design "B."

Every opening into an elevator well or hoistway should be enclosed. Passenger elevators require doors at each floor landing and for these many interlocking, both of the mechanical or electrical type are in use. In factories gates of the automatic or semi-automatic type are generally employed at floor openings. The department prefers the semi-automatic

gates on account of the greater degree of safety. The objection to the automatic gate is the large unprotected opening caused by the approach of an elevator. When the gate opens any object may roll or be pushed down the shaft on the car or a careless employee may stick his head out into the shaft and be injured. The semi-automatic gate opens only if the operator intends to make a landing.

The department has met with considerable difficulty in obtaining compliances with orders for elevator gates in such factories where space for installation was at a premium. In most of these cases fire-doors and low ceilings were the cause. But the department solved the problem by directing the installation of collapsible gates, a drawing of which appears on pages 92 and 93. One type of a gate occupies no more

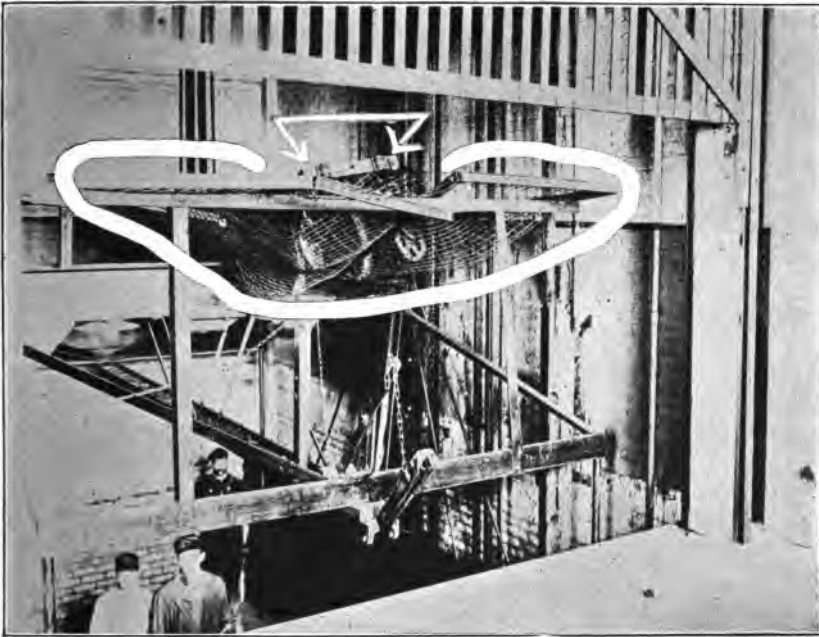


Figure 20.

than three inches, when closed at the top, permitting ample room for entrance to the elevator car.

THE DUST PROBLEM.

The dangers of dust in various industries has long been regarded with great seriousness from two viewpoints:

- a. Hygiene, and
- b. Explosions.

The hygienists tell us that to work in a dust-laden air is entirely incompatible with modern factory science. In each individual industry we find a particular kind of dust, which in most cases has been determined harmful to the employee. Here in Illinois two dusty industries in par-

ticular are very prominent on account of the large number of people engaged, the clothing industry and the metal polishing trade. In the former we find various vegetable dusts from the fibre of clothing materials, in the latter emery dust, glue dust and fine particles of lint. In both instances the health danger is preeminently tuberculosis, although throat troubles of all kinds result in innumerable cases. More

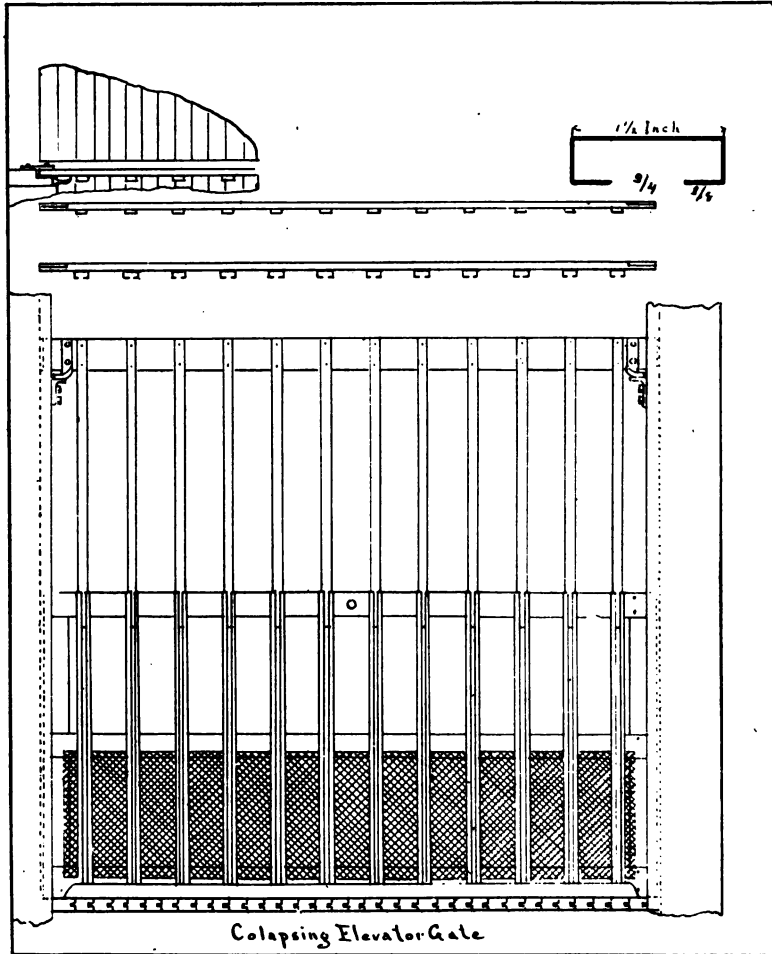


Figure 21.

scientific information relative to lead and other mineral dusts is to be found in the various articles of our occupational disease department.

Important as the health aspect is, it is not the province of this article to dwell on that phase of the subject.

Most employers have failed to recognize the fact that dust, besides being injurious to the health of their workers, causes them to loose time and diminishes production, because the workers cannot give their undi-

vided attention to their work when breathing air that is filled with irritating and offensive particles of various matter.

The erroneous opinion has prevailed, especially in the smaller plants, that dust is an unavoidable evil. This mistaken belief should be corrected, because dust can be greatly reduced, if not entirely eliminated, in every plant without prohibitive expense. Every employer should know these two things about dust, that he is jeopardizing the health of

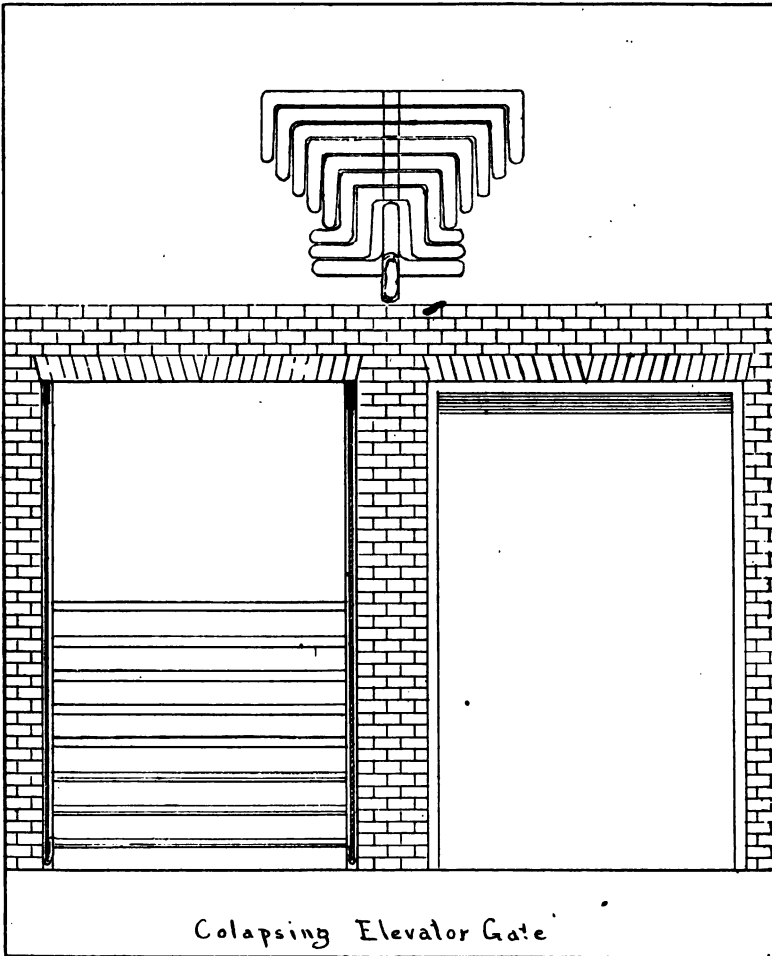


Figure 22.

his employed and that he runs the risk of having an explosion in his plant, if he does not take steps to eliminate the dust problem.

When a dust explosion occurs myriads of fine particles of solid matter enter a state of instantaneous combustion, while held suspended in the air.

This assertion borders almost on the ridiculous at first, but accident records in all parts of the country, and particularly here in Illinois in the large starch mills, testify the error of such judgment.

Most people point to a barrel or pan of starch and scoff at the idea that the possibility of an explosion exists. A pan of starch certainly is not explosive in the same sense as a case of dynamite. Starch in compact form is combustible, but not explosive. However, if the identical starch is blown into the atmosphere in the form of dust, the matter becomes one of vital concern to those in or about the plant.

Numerous ways in which dust explosions have been started, are on record. The suspended dust ignites, the flame shoots through the air like a streak of lightning, and most often leaves a trail of ruination.

The difference between suspended dust and dust lying in a quiescent compact mass, may be clearly illustrated with starch powder. In one of the largest plants of its kind in this country (in this State) several starch explosions have not only blown out the walls of the factory, but have resulted in loss of life. The matter was officially investigated by this department. It was found that the starch in bulk was harmless, but on account of the peculiar process of drying, through which it was put, caused all the loss of life and destruction of buildings. Particularly in the drying rooms the air is filled with fine particles of starch dust. The starch is carried in wooden containers, which as soon as the heat dries the starch are shaken out into a conveyor. Through this process of dumping the nails become loose and fall into some part of the machinery causing a spark. In a second the dust catches fire and results in an explosion, because the dust and particles expand so rapidly.

When a particle of any combustible dust burns while suspended in the air, it heats a little shell of air immediately around it to a high temperature. Thus air heated in this manner expands very rapidly and forcibly. In order to obtain in some degree an idea of what happens in a dust explosion we must picture this action repeated simultaneously about every one of the thousands of millions of particles of dust that are involved in the explosion. It requires no stretch of the imagination to realize that the effect will be prodigious and give rise to appalling devastation. It is not uncommon to find such an explosion resulting in the death of many men, blowing down walls and doing other damage.

Just exactly how much dust is required in the air to make an explosive mixture varies with the nature of the substance. It is said in the case of coal dust, that two ounces or more of fine coal dust per cubic yard of air results in an explosive mixture. The proportion is probably correct for most dry organic dusts in general. To illustrate the energy of a dust explosion, this will serve as a calculative basis. Returning to the starch dust previously mentioned, let us assume that two ounces of starch are contained in each cubic yard of air. It is reported that two pounds of dry starch, while in a burning state, gives off approximately 7,500 B. t. u. of heat. Therefore, two ounces would give off almost 1,000 units, which under the assumed conditions, is the amount of heat that would be set free in each cubic yard of air. Of course, in the production of mechanical energy this total could not be exerted, but assuming that five per cent of it could be, then the amount of heat transformed into mechanical work, as the result of the explosion of the starch in one cubic yard of air, would amount to over 47 B. t. u., equivalent to nearly 3,500 foot pounds. Therefore, in a room of very ordinary size, a million foot-pounds of mechanical energy could be readily developed.

Materials of any kind may bring on dust explosions, if that material dust is combustible when finely divided. Some materials are far more dangerous than others. Even metallic powders under favorable circumstances are considered explosive.

Coal, soot, wood-dust, cork, tanning bark, malt, flour, starch, sugar, wool, organic fabrics of various kinds, oakum, metallic dyes, bronze, resins, celluloid, sulphur, and naphthalene are some of the substances which form explosive dusts under certain conditions of manufacture.

In considering explosive dusts, as found in our industries, two general groups may be outlined:

First—Such dusts which readily ignite by lighting a match in the dust-laden atmosphere;

Second—Such dusts which would require a source of great heat, as for instance a powerful arc lamp or a flame of gas.

In the first group may be included sugar, dextrine, starch, cocoa, rice refuse, meal and sugar refuse, cork, fine wood-dust, malt, oat husks, grain in flouring mills, maize, grain in storage, corn flour, and flour in flouring mills. These dusts are enumerated in the order in which they are considered most dangerous. Sugar, dextrine, starch and cocoa form the most hazardous and experience shows that they have been responsible for many frightful explosions. Sugar dust ignites, when coming in contact with a surface heated to 1,400° Fahrenheit, and does not require contact with an actual flame.

It is well known that coal dust, particularly in mines, has occasioned many serious accidents, but only a short discussion can be entered into here, as that subject will be found amply discussed in the reports of the United States Bureau of Mines.

In an article of this kind we are more concerned with the causes of dust explosions in manufacturing plants. Dust explosions in industrial plants are due to:

1. Masses of dust dropping from beams, rafters, and other overhead places upon burning gas jets, lighted matches, or other exposed flames.
2. Accidental production of sparks from nails, stones or particles of grit, coming into contact with moving parts of machines.
3. Drafts, which carry dust-laden air into boiler rooms or other places, where there is a fire or an open flame.
4. Naked lights, such as candles, oil lamps, lanterns, being carried into dusty mills, especially into dust-collecting chambers.

The most natural question now is, how are these dust explosions to be avoided. If various main causes are removed, much will be accomplished toward the prevention of these explosions, although various minor and occasional causes must be considered.

The primary rule to follow is, to avoid the creation of dust as far as possible.

Every dust generating machine should be provided with an exhaust hood, in order to prevent the dust from being deposited throughout the plant. It is easier to arrest the dust at its source, than to attempt a control or removal after it has been carried over the entire room or plant. Dust is so fine that its entrance into a room cannot be entirely prevented, however, by the mechanical means just suggested it can be cut down to its most harmless form.

All plants should be thoroughly cleaned frequently. Beams and other lodging places should be boxed in to prevent the accumulation of dust. The most efficient manner of cleaning away dust is by the use of the vacuum system, because sweeping always stirs up the dust to a considerable extent. Danger often lurks in rooms with open beams covered with dust, when the building receives a jar or a belt in the room breaks and hits a beam. In cases of this kind belts have thrown large clouds of dust directly into an open flame and caused an explosion.

When sweeping is done the floors should be sprinkled to prevent the dust from filling the atmosphere and settling back on the objects just cleaned.

Matches should never be struck in plants, where dust explosions are liable to occur. In fact, matches should never be carried into them; nor should lighted candles, gas jets, oil lamps, lanterns, burning cigars, cigarettes or pipes be admitted. The incandescent electric lamp is the only form of artificial light that should be permitted. Care should also be taken with electrical wiring, which should be thoroughly insulated and laid in pipes. Fuses, switches and circuit boards should be located in hall-ways or in other places where the air is as free from dust as possible. Electric motors should never be installed, where the process of manufacture creates dust.

In all dusty trades careful observation of every machine should be had to see that none becomes overheated. Millstones often become overheated causing an explosion in the feed-chute.

Any material of a granular nature should be screened before grinding in order to remove nails or bits of metal, which might strike a spark when coming in contact with the revolving machinery.

It is said that large belts have been responsible for some serious dust explosions, because they often emit static electric sparks. This may be eliminated to some extent by grounding all machinery.

Such dusty processes which cannot be effectively safeguarded by any methods herewith suggested, should be conducted in separate buildings, placed at a distance from the rest of the plant, and constructed preferably not more than one story in height.

NEW MACHINES EQUIPPED WITH GUARDS.

Since the campaign for safeguarding dangerous machines was started but a few years ago, manufacturers who contemplate the purchase of new machinery are insisting that the builders completely equip machines with guards and safety devices, instead of attempting to install protective devices after the machine has been set up in the shop. Builders of machinery have come to recognize this demand and are gradually designing new machines with a full equipment of guards. The advantage of having guards incorporated in the original designs often means the saving of valuable space. And by designing the guards and the machine at the same time the appearance and effectiveness both of the machine and of the guard will be improved.

American manufacturers have slowly learned this point, whereas European designers have long been furnishing fully-guarded machines.

The Federal bill introduced in Congress would regulate the shipment of machinery, so that where a machine is sent from one state into

another it would first have to be equipped with the necessary guards. As it is today unguarded machinery is sent into a state having strict safety laws, and, therefore, the burden is thrown on the purchaser to spend more time and money in securing and installing the safety guards.

ACCIDENTS CAUSED BY FLYWHEELS AND PULLEYS.

Our reports show numerous accidents due to bursting of flywheels or pulleys. This same fact has been and still is reported by every state department of labor without further explanation of cause or suggestion of future avoidance.

In many cases this class of accidents results from internal stresses in the material, due to faulty design or too careless cooling of the casting. However, severe internal stresses have seldom been noticed, except in wheels made in one piece.

On the other hand wheels of this kind have burst without any apparent cause. Visual examination often discloses no defects and when the material is examined it often happens, that no cracks, blow-holes or other defects can be found.

The only other explanation, therefore, lies in the composition of the mixture at the time of pouring the metal in the foundry. Chemical analysis has established that fact. This method of using an unsuitable grade of iron for machine castings is most often resorted to in the smaller foundries, where metal is required that flows freely to fill the forms well. Iron of this kind usually contains a high percentage of phosphorus, which lowers the melting point, but causes the iron to become brittle.

Phosphorus, especially in machine castings, should never be present more than four-tenths of one per cent, otherwise the brittleness of the metal will cause a break and flywheels or pulleys running at a high rate of speed may cause destruction in the plant and loss of life.

ADVANTAGES OF INDIVIDUAL MOTOR DRIVE.

The individual motor drive of machines is rapidly crowding the older method of transmission out of the factories, mills and workshops. The individual motor drive saves a great amount of power by eliminating transmission losses, which always exist in long lines of shafting, and none is wasted when the machines are stopped. The individual drive consumes power only when it is needed and avoids spending of time in shifting belts. With the older method long lines of shafting must be kept running for one or two machines, which means that more power is being used than is necessary and wasted to overcome friction of bearings and idle belts. The older method involves the expense for pulleys, bearings, couplings, belts and lubricants.

If an engine breaks down an entire set or series of machines will be put out of service, because they feed from the same line shafting, during repairs this same situation occurs. Such a condition means loss of production. The changing or removal of pulleys often require the taking down of line shafting, delaying production and costing considerable expense for labor. The individual motor drive avoids such delays and losses.

In addition to these many advantages of the individual motor from the productive viewpoint, there is another phase of utmost importance, that of the safer working conditions to the employed. It may therefore be said, that the individual motor drive eliminates many industrial accidents.

Line shafting and countershafting are responsible for many horrible injuries and deaths and have claimed a heavy toll in this State. Every shaft, aside from its own dangers, begets additional hazard-points in the form of many belts, pulleys, keys and set-screws, to which another long list of fatalities and injuries in factories and mills must be added. The individual motor avoids these accidents by reason of the elimination of these transmission accessories.

The ordinary machine receiving its motive power from a line shaft must be started by means of a treadle or a lever, which shifts a belt or operates a clutch. Many machines have been started by the accidental touching of these treadles or levers, thus contributing to the fatal and nonfatal accident list. The operation of starting a machine driven by the individual motor is accomplished by means of a switch, which can be placed in a secure place, thereby making accidental starting of the machine practically impossible.

A further source of danger is always created, when an employee tries to reach some part of a shafting by means of a ladder. Shafting is usually located along the ceiling and men often work on the ladders in a crowded and cramped position, exposing themselves to danger.

With machines operated by individual motors there is no obstruction of space either above or around the machine. For this reason cranes and overhead runways can be operated free from danger, such as would be the case where shafts and belts make a passageway for the crane difficult.

Line shafting requires that machines be placed in parallel lines often back to back, so that half of the men are compelled to work in their own shadow, while the other half face the light. This arrangement is necessary to economize on floor space. Working in a shadow, or under constant artificial light, and in a crowded space tends toward the production of accidents. But with the individual motor drive the machines can be arranged to the best advantage for light and plenty of free space about the machines.

NOISES CAUSE ACCIDENTS.

The song of our industrial plants is set to the music of whirring gears and wheels, clanging hammers and the hissing of steam.

The problem of noise-suppression in factories has caused the adoption of silent chain-drive and noiseless gears and pinions. Much noise can be eliminated by building solid foundations for machines and by replacing steel for machine parts with less resonant material.

Statistics are not available to show what percentage of accidents may be attributed to noise. That noise causes fatigue is well known. What part noise plays in causing fatigue is best obtainable by studying conditions in factories, where the observance of warnings mean safety for the men. In the great steel mills the sounding "stand clear," when a ladle of molten metal or some heavy load is being transported from one sec-

tion of a shop to another by means of an overhead crane, is repeated many times daily. Usually pneumatic hammers kill any warning sound. Older employees are used to the daily noises and are likely to notice new or unusual sounds, like signals, but the newer men, being unaccustomed to the regular noises, become so confused that they will not hear a warning signal.

Ranking the five senses according to their greatest value from a standpoint of safety, we find sight first, and hearing second. It is certain that injury will come to the man, who cannot see dangerous conditions; and likewise, the man who cannot hear a warning signal is in great danger of accident in a shop. Many workmen are partially deaf, but are able to perform their work without great danger to themselves, simply because the shop conditions present no special dangers. But this same class of men in a noisy shop, where good hearing is required for the purpose of safety, would run chances of immediate accidents.

We stated before that noises cause fatigue. Fatigue has a peculiar influence in causing accidents. Loud, banging noises, as resound through foundries, mills, and factories, even though of short duration, irritate the average person, but when continued at longer intervals all day, and every day, the effect is serious on the nervous system and this continued noise becomes a factor of greatest importance in causing fatigue.

Industrial accidents will be greatly reduced, if every noisy mill or shop would adopt a system to suppress noise, because fewer orders and directions would be misunderstood. Orders given, but not received by the workmen or only partially understood, will increase accidents, but orders received and heard will increase safety to an extent, though hard to measure, yet none the less real.

BELT JOINTS.

Every book of safety-standards and every factory inspector's report points to the danger of unprotected belts, but very few have called attention to the real source of danger from belts, namely the belt joints. There are hundreds of thousands of miles of belts in operation each working day of the year. These belts vary in width and length, are operated at various speeds and under different conditions.

Belts are one of the most important auxiliary power-transmission apparatus and are one of the most prolific sources of industrial accidents because when joined by a fastening device, it becomes a fast-traveling accident-producing agent. The following discourse will deal primarily with the methods of joining of belts.

Various methods for joining belts are in use, such as riveting, lacing, sewing, cementing, or by using hoops or clips, and sometimes a combination of these methods is employed. Each method finds its advocates, but even these will differ among themselves as to the best methods of doing the work. Agreeing that lacing is the most efficient method a group of machinists will differ, when deciding whether rawhide or wire is preferable.

One of the commonest methods of joining belts is that of covering the ends after they have been scarfed down with cement or glue and pressed until firmly held together. This method is the only one, which

provides a smooth running surface. When cement-joined belts are put in service, the tapering end of the scarfing should turn *with* the pulley that is most likely to slip.

But any method of joining belts must depend upon the one essential thing of seeing that the work is done properly. Like the chain, which is no stronger than its weakest part, the belt will break and cause an accident, if the joining process was poorly done.

If the tapered lap of a joint becomes loose, a danger of accident is created. The main objection to a cement-joined belt is the amount of time required to place it into commission. When lacing is done by machines or the belts joined with wire clips only a few minutes are consumed. But both of these methods are accompanied by possible dangers, when the rawhide lacing becomes loose or the wire lacing has been broken. In both of these instances clothing of workmen may be caught and result in serious injury.

One of the main causes for the breakage of belts at joints is the overloading of belts. In most cases the safe working load of a belt is never estimated and the tension is generally arrived at by guess-work. If belts are tightened during rainy weather, excessive strain will result to both belt and shafting when the belts dry out.

FIRE ESCAPES.

Fires still continue their disastrous work. In the past few years factory fires have taken hundreds of lives, which goes to show, that our concern for industrial safety is still in its infancy. In every case it was shown that the appalling loss of life was due to lack of exits or escapes.

The various types of fire escapes are too numerous to mention here. Some are of good design, but many are only fair and others are "escapes" in name only.

The "Health, Safety and Comfort Law" demands more than one means of egress, it states that sufficient means of escape shall be provided and these means must be unobstructed at all times and ready for use at any moment. All fire exits must be plainly marked.

When stairways are used, they should be enclosed in fireproof and smokeproof walls.

There are different kinds of escapes: The fireproof stairs, just mentioned, the balcony type, the chute or spiral type and the most common kind seen on almost every building consisting of a series of stairs with the unit nearest the ground counterbalanced.

The last mentioned type is quite efficient, but should be constructed according to the emergency needs of a factory. Balconies connected by stairways, should be provided at all floor levels. The stairway nearest the ground should be so hinged and counterbalanced, that the additional weight of a person descending on it will swing it to the ground. Improvements have been made on this type of escape, because the treads incline sharply and the horizontal position of the stairway forms a dangerous footing. These escapes are now designed so that the hinged stairway will swing to the ground when a person approaches from above and before the person actually steps on the stairs. This is usually accomplished by the first person to descend, who pushes against a lever, which

releases the hinged stairs. By the time this person touches his foot on the first tread of the hinged stairs, this stairway has reached the ground, thus forming a continuous and solid stairway.

Fire escapes should always be constructed of noncombustible material. The stairs should be at least three feet in width in the clear for the accommodation of not more than fifty people and this width should be increased by at least four inches for every group of fifty persons. Balconies and stairs should have a sustaining power of a live load of 90 pounds to the square foot and the railings on balconies and stairs should be able to withstand a side pressure of not less than 50 pounds for each lineal foot. Railings should be at least three feet in height. The rise in stairs should never be more than 9 inches, and the tread should never be less than 7 inches wide.

EYE PROTECTION.

In almost every industrial process eye injuries are common. Therefore, eye-protectors or goggles have come into use.

In the iron and steel industry eye injuries have been prolific on account of metal chips and dust lodging in the eyes. Molten metal and acids splashed into the eyes cause burns. Men, who work in the glare of furnaces, or with welding torches receive eye disorders. To relieve the eye of such intense light, the use of colored lenses is suggested.

In any operation which causes chips to fly the worker should wear eye-protectors, not only the man performing the work, but others nearby as the chips might injure them.

Grinders have adopted light amber-colored lenses to protect their eyes against the steady stream of sparks and dust given off by the grinding wheels. High speed machine tools of various kinds often throw chips with much force.

In foundries, moulders, pourers, cupola men, and others, impair their vision as a result of exposure to intense light. Dark-colored lenses have been adopted in foundries, both for the protection against the powerful light, as well as against the small explosions, which take place when the metal is poured while the molds are damp.

It is often difficult to persuade workmen to wear goggles, because they believe the vision will be impaired or because of the unbecoming appearance. The usual argument, that previous immunity from accident will continue, is erroneous. Safety goggles in the industries enumerated above will become universally accepted, when workmen notice the large number of eye injuries in their same shop. One accident generally is the best teacher and more convincing than wordy arguments.

In many instances goggles are provided by employers without charge to the workmen, but even when this is not done no workman at a dangerous occupation can afford to be without them.

PUNCH PRESSES.

Before entering the subject of safety in the press-working of metals a brief historical sketch of the art of working and shaping metals will be of interest.

History is silent on the origin of shaping metals by means of dies operated by presses, until the seventh century before the Christian Era, when coins, upon which images or inscriptions occur, were stamped with the aid of presses and dies.

It is recorded that Tubal Cain, the brother of Noah, was the first worker in brass and tin. Ancient specimens evidence creditable skill in metal-working.

Nevertheless, it remained for the twentieth century of the Christian Era to develop press-work, which has made possible the cheap, rapid and uniform production of supplies, utensils, jewelry, typewriters, automobiles, sewing machines, and numerous useful, as well as ornamental, articles known only to modern civilization.

Metals are usually worked while cold, although some press-work requires the metal to be heated. In its simplest form a press consists essentially of a bed, a ram, and a pair of dies, which when forced together give a piece of metal that is placed between them a certain shape.

The principal danger connected with operating a press occurs in the feeding, which consists in inserting the metal between the two dies, either in the form of sheets or strips, or as partially finished work ready for further additional manipulation. Feeding is generally done either manually or mechanically, according to the nature of the work. Mechanical feeding devices are usually automatic in action.

On an unguarded hand-fed press the operator, sooner or later, is likely to lose the tip of a finger or have his hand crushed. The most skillful operator cannot hope to escape injury forever, merely relying on his own watchfulness and care, since the number of operations necessarily performed in the course of a working day mounts up into the thousands.

The inexperienced might assume that the greatest danger lies with machines that operate continuously. The fact is that injuries result more frequently in connection with machines that are stopped after each operation either by an automatic clutch or otherwise, and that are started again by manipulating a lever or a foot-treadle.

Hand feeding requires that operators frequently pass their hands between the upper and lower dies in order to insert and remove the work. Operators often acquire the habit of moving foot and hands rhythmically. While this increases the operator's efficiency, it also is the cause of most accidents and certainly increases the hazard. The machine hand becomes so automatic that his actions are controlled by the machine instead of being determined by the exercise of judgment and will. Should the attention of the operator be diverted from his work, or if a momentary delay in inserting or removing the work takes place, he is apt to start the machine unintentionally and be seriously injured. The constant and monotonous repetition of the same act with the same expected result inspires the operator with false confidence. As the work progresses the press may be gradually getting out of order. This fact will remain unknown, until the ram fails to stop at the top of its stroke and descends again immediately, much to the surprise and injury of the operator.

The problem of punch press accidents has brought forth safe-guards of various types, many of which are on exhibition in our safety museum

for public inspection. For removing light work compressed air devices are sometimes used, while in other instances suction or electro-magnetism accomplishes the same results. Spring ejectors or some other automatic mechanical device are employed with satisfaction on heavier work.

Power presses which are operated by the simultaneous use of both hands are considered safer than others, next to those that are fed automatically. A press equipped with a guard, which comes down in front of the work, or around it, before the ram descends, should have its mechanism so arranged that the press cannot be started until the guard is in the "safe" position. Other presses are so arranged that the mechanism cannot engage the upper die until this die is within about an eighth of an inch of the work. Should the fingers of an operator be in the way of the die, on a press of this type, they will prevent the driving mechanism from engaging and forcing the die down upon the work.

When safeguards are ordered on presses, employers generally raise the objection, that they interfere with production or lessen the output. Employers often forget the moral duty which they owe their employees. To produce a certain number of pieces each day, everything else being equal, is not the whole problem. In the long run a press without a guard increases the operating cost, which is often greater than the price of a guard and the decreased amount of production. Shop discipline is always destroyed and output temporarily stopped, when a man is injured on an unguarded press, and should it be necessary to train a new man considerable time is lost, which the employer must likewise take into consideration.

The objection is frequently offered that the introduction of guards loses time. That may be true for just a few hours. Every employee must learn to operate any new machine, but after he has mastered the difficulties production is accomplished at a rapid rate. So it is with a guard. As soon as the operator has accustomed himself to the device, production proceeds at an increased speed, because the employee feels a certain security, which eventually spells permanent increase in efficiency.

Even with the best mechanical safety appliance operators should use good judgment and care, as guards are not designed to protect the shop fool. Unnecessary chance, despite the best obtainable guard, results in accidents. Operators should exercise particular care, when making repairs or changing dies, to set the machine so that it cannot "repeat."

When operating a press or other dangerous machine employees should never permit their attention to be drawn away from the work, because an accident is sure to occur.

Having considered the hazard at point of work on a power press and the methods of safeguarding against accident, a few words are appropriate concerning other precautions in the operation of presses, such as proper illumination, the proper use of foot treadles, spacing of machines, proper clothing, dangerous belts and pulleys, and clutches.

For increased efficiency presses should be so located that the light strikes directly upon the dies, or when artificial illumination is used, the lamps should be of proper strength and placed so that the eyes of the operator are shielded and that the point of work is readily visible without strain.

Loose pulleys should be well lubricated, when presses are operated with the use of tight and loose pulleys. Otherwise the loose pulley might seize on the shaft and start the machine unexpectedly. To prevent the machine from creeping the belt shifter should be so arranged that it may be locked in position on the loose pulley. Reliable clutches are preferable to tight and loose pulleys. The shifting lever of the clutch should always be provided with an effective catch or latch that will lock it in the "off" position, securely and automatically, whenever the press is stopped.

Some presses are set in motion by a foot treadle, the operator usually standing or sitting with one foot constantly on the treadle. It is advisable to have a fixed block of suitable height beside the treadle, to afford the operator a convenient foot rest, when he withdraws his foot temporarily from the treadle. The treadle should always be provided with a separate lock or stop, wholly independent of the lock that is on the belt-shifter or the clutch; and whenever the machine is stopped for adjustment, cleaning, or any other purpose, both of these locks should be set in the "safe" position.

There should be ample clearance about the dies and they should be properly set in the press.

Cleaning dies or other parts of continuously-operating presses while the machine is in motion should be prohibited, as such practice is sure to result in injuries.

Loose-fitting jumpers or garments with ragged ends should not be worn. Women operators should wear caps, as many serious and fatal accidents have been caused by loose clothing and hair being caught in revolving parts of machinery or belts.

Drive belts and pulleys, especially when these are near passageways, should be provided with adequate and substantial guards.

Numerous guards for punch presses, for belts and pulleys, effective clutches and other devices, illustrations and drawings are open to inspection in the safety museum of this department.

DANGERS OF PAPER BOX MACHINES.

Paper boxes are now made almost exclusively by power machines, which have supplanted the old hand-operated machines. Since the arrival of the power machines women and girls have taken the places of male employees.

The first dangerous process encountered in a modern shop is met with at the scoring machine, which marks and scores the box-board stock, so that it can be easily folded into any desired shape. The danger points on this machine are essentially the circular knives, the feed rolls and the feeder. Circular knives should have guards placed in front of the knives to prevent the operators' fingers from being cut. As a rule the operators need not put their hands near the knives, but accidents are liable to happen, when an operator attempts to straighten or adjust a piece of misplaced stock as it is about to be engaged by the knives.

The corner-cutting machine, which cuts out the scored corners to allow the sides and ends of the boxes to be folded or stayed, is the next danger source in a shop of this kind. The corner-cutting machine is practically the same as a shearing press having two cutting edges at right

angles with each other. A strong metal guard should be provided in front of the cutter and attached in such a manner that it can be adjusted for any height of the varying thicknesses of stock. Corner-cutting machines are similar to punch presses and should have devices installed that will prevent the operation of the machine as long as the operators' hands are in the danger zone.

The most dangerous machine in the paper-box industry is the corner-staying machine. The end and side of a box placed over a right-angled anvil are held in place by the operator while the staying material, either gummed paper, cloth, or wire for clips, is fed over the corner and pressed into shape. The danger to the operators' fingers is brought about by their fingers coming too close to the anvil, when the ram descends. Devices are on the market which prevent the ram from exerting any pressure until it has come within a fraction of an inch of the anvil. These devices stop the ram when coming in contact with the fingers.

The next process in the evolution of the paper box is the decoration work. Boxes are decorated with various lithographed or embossed finishing papers. This paper is received in long strips wound upon reels and in its passage through the machine the strip goes under a pulley which dips into a receptacle containing paste or glue. Being thus made adhesive the paper is applied to the sides, top, or bottom of the box, by the operator. In the process of receiving the adhesive the paper often breaks and the operator is required to thread the paper strip through the rolls again, which involves great danger on account of the many moving parts on the machine.

Another source of danger in the paper-box industry is the slitting machine, which cuts the stock-sheet so that a number of boxes can be made from it. This machine resembles the scoring machine and should likewise be provided with guards in front of the rapidly revolving knives.

It often happens that the sheet of box-board is too small to make the sides, end and bottom of a large box. In that case only the sides and ends are made with a narrow flap all around the inside of the lower edge. The bottom of the box is then pressed into place by an ending machine, which applies the paste to the inside of the flap.

Like in all other factories the power-transmission apparatus, belts, pulleys, and motors should be effectively guarded, especially because such a large number of women and girls are employed in this industry. Loose hair and clothing is liable to be caught in unguarded gears, fly-wheels, pulleys, or belts.

The large quantities of waste box-board should never be permitted to accumulate on the floor, as this constitutes a fire hazard, practically all the material in a box factory being inflammable.

BELTS, ROPES AND CHAINS.

Numerous accidents have been attributed to shafting and belting as well as ropes and chains, first on account of breakage, secondly on account of hands or clothing being caught. Almost every factory or workshop uses belts, and occasionally rope and chain drives, as a means of power transmission.

Breaking of belts is attributed to various causes. The life of a belt depends to a great extent upon temperature, moisture, the tightness or looseness of belts, the style of lacing and fastening. Friction causes leather belts to break, because the heat destroys the fiber. A dusty shop will wear its belts out rapidly, because the gritty dust causes abrasion, especially on belts, that hang loose on revolving shafts. In the case of chains, wearing is caused by friction between the links and the sprockets.

It does not require a vivid imagination to picture what happens, when a belt breaks in a busy shop. If a belt is defective and breaks the adhesion between the belt and the pulley sometimes causes the belt to roll up and then shoots it off with the rate of speed, as that travelled by the pulley. A shot of this kind reminds one of a cannon ball, both come with great speed and both are deadly. Then again a breaking belt may start to roll up, get caught on some projection, and pull down an entire line shafting. A piece of belting one-half inch thick and three feet wide and five feet long, weighs approximately 40 pounds. A piece of belt of this size moving at a speed of 3,000 feet per minute possesses more than 1,500 foot-pounds of mechanical energy. In order to stop that size belt or resist it we would have to exert the same amount of energy, as, for instance, is required when raising one hundred pounds to a height of 15 feet.

To provide against such accidents belts should be enclosed in suitable and strong guards, which will prevent the belts from being thrown off in the event of a break.

Another kind of accident, for which belts are famous, is that in which a workman's clothing or hands are caught in a moving belt. Of all industrial accidents this is one of the most fearful kind and invariably results in death attended by horrible mutilation. Records and descriptions of such accidents are numerous enough to fill pages of this report.

All vertical and inclined belts, as well as rope drives, should be completely enclosed to a height of at least six feet above the floor, if the guards must be less than 15 inches from the belts. Guards of pipe or angle iron may be used, if they are at least 42 inches high and are placed 15 inches or more from the belt, rope, or pulley that is to be guarded.

Assuming that a belt transmitting power from the main shafting on the floor below to a machine on the floor above is guarded by a pipe-rail, a serious accident will occur, if a workman leans against the guard, which is close to the belt on the floor above by having some part of his clothing drawn into the narrow slit in the floor by air suction, or by the belt clips.

In building guards around a belt due regard must be had of the speed and width of the belt. Overhead belts, seven inches or more wide and running at a speed of 1,800 feet or more per minute should be enclosed by extra substantial guards. In such instances a heavy wire mesh or perforated steel guard promises good protection. Enclosed with either one of these materials greater safety is assured than by the use of the ladder guard with open rungs, because the broken belt is apt to fall through or get caught on the rungs. If the upper part of a horizontal belt or rope-drive is less than six feet above the floor, the belt or rope should be completely enclosed on the sides and top or guarded by a standard railing located at least 15 inches from the belt. Unless the

lower part of an overhead belt is seven feet or more above the floor, the belt should be guarded both on the sides and bottom.

On account of the high speed of belts adequate provisions should also be made for shifting them with safety. Numerous approved mechanical belt-shifters are on the market, which may be used in connection with tight and loose pulleys. Belt-shifters should be equipped with rollers at points coming in contact with the belts, because the use of rollers will reduce the wear on the edges of the belts and prevent them from becoming ragged, which is apt to cause the belt to catch in the belt-shifter. The handle of the belt-shifter should be located within easy reach of the operator, so that he may reach it in his regular working position without any inconvenience.

From a standpoint of safety it is poor judgment to allow an unshipped belt to ride on a revolving shaft. The danger lies in the traveling of the belt until the part where the belt is joined by lacing, reaches the shaft and is drawn tight enough to engage the driving pulley, which will cause the machine to start suddenly. On that account unshipped belts should be hung on a belt-perch.

In many shops belts are shifted by hand or the use of sticks or poles. Both of these methods should be stopped. The practice of removing or shifting belts with the feet, should earn an employee's discharge.

Dressing a moving belt to prevent it from slipping is dangerous. The safest way would be to remove a belt, but this involves a great loss of time and expense for labor. Small belts can be handled that way, but in the other case extra belts would have to be kept on hand. The heavier and larger the belt the less feasible it would be to remove it. The best advice on this subject is to select the most careful man in the shop and instruct him to apply the dressing at the point where the belt leaves the pulley. This man should make sure that his clothes are not hanging loose, so that they will not be caught on the belt fastenings. Liquid dressings should be warmed to permit an even flow. It should always be applied with a brush and never with waste or rags, as these are apt to catch in the fastenings.

Besides belts the other type of power transmission apparatus considered very hazardous is the chain drive. Chains are invariably installed in a horizontal position, both sprockets being in reach of the workman. But to save him from having his clothing or fingers caught between the chain and the sprockets, they should be completely enclosed.

Although most shop managers are careful to notice that overhead shafting is securely fastened, it is well to call attention to the fact, that if one hanger is loose it throws a burden on the other hangers, and in time will throw the whole shaft out of alignment. Should this happen the shaft revolves in an eccentric motion and a belt will become tighter during one part of a revolution of the shafting than during the remaining part. The ultimate result will come when a heavy load is applied at a moment when the belt is abnormally tight. Under such circumstances the probability is that the whole line of shafting will be pulled down and it is no difficult matter to imagine the ruinous results when a section of shafting weighing tons and running the length of the building comes down.

The oiling of bearings on moving shafting invites danger, yet few shops will shut down the engine for this purpose. A bearing is now on the market, known as a "ring bearing" which automatically supplies oil to the bearing from a small reservoir holding a week's supply of oil. For the ordinary kind of bearing an oil-can is now in use having a neck or spout bent in the form of a U at one end, the neck being long enough to permit the oiler to lubricate the bearing while standing on the floor. The use of ladders for the oiler to climb up on is practically suicide. The safest method is to provide the oiler with a movable platform upon which he can stand free from all danger, but near enough to reach the shafting with his oil-can.

On many shafts one will find protruding dead ends, which should be boxed in or guarded with wire mesh. All horizontal shafting and pulleys not more than seven feet above the floor should be enclosed, or guarded by railings at least 42 inches high, placed not less than 15 inches from the point to be guarded. Suitable precautions should be taken to prevent pulleys from working off at the ends of their shafts, and a clearance of at least 36 inches between every pulley and the nearest shaft bearing should be provided, but if this is not feasible a screen guard should be located between the pulley and the shaft bearing.

In all instances safety couplings, collars, and, set screws should be adopted.

The projecting key is a source of danger. It usually escapes notice on account of its small size. Should a man be sent to oil or repair a shafting or pulleys, especially in an out-of-the-way place and cramped quarters, there is danger of having his clothes caught and wound around a shaft.

THE ELECTRICAL PROBLEM IN SHOPS.

In another article in this report we discussed the superiority of the individual motor drive over shafting and belts as a means of power transmission. We will now touch on the problem of preventing electrical accidents in shops, where electricity has been adopted for power purposes.

Almost all electrical accidents in shops are due to lack of proper maintenance of the electrical equipment. Those accidents due to naked carelessness or gross ignorance and to the shop joker will not be considered in this discussion.

Prevention of electrical accidents depends largely upon the apparatus selected and the method of installation followed.

In the first place all motor frames should be grounded, regardless of whether they are direct-connected to the machines or not. Even with a pressure as low as 200 volts this precaution should be taken. A machine to which the motor is directly connected may become charged by a short circuit and cause injury to the operator. But regardless of whether the electrical current does not injure the workman, it may throw him against some swiftly running machine or hold him at the charged machine, until he is injured by the moving parts.

For absolute safety the rotating parts and all exposed live parts of a motor should be encased with sheet metal. The wire-mesh type of guard should not be used around a motor or its parts, especially when the machine, which the motor drives, is a metal cutting machine, because

the openings in the mesh will permit metal chips to enter the wire guard and result in a short-circuiting of the motor. A conduit should house the cable connections between the motor and the controlling apparatus as close to the motor as possible, and the remaining unguarded part from the conduit to the motor should be heavily insulated. Care should be taken to protect all conductors against moisture.

The control on every piece of machinery is of greatest importance, more particularly from a viewpoint of safety. But in this respect the electric drive has an advantage over other forms, because the control can be placed any place desired within easy reach of the operator. The immediate-relief action provided by the accessibility of this control, as compared with the time required for one of the men to notify the engineer to stop the machinery or to put on a brake, may be the determining factor of saving a man's life.

To guard against overloads the fuse and the circuit breaker are commonly used as protective devices. On account of operating very quickly circuit breakers are considered preferable. It is a simple matter to replace them without danger. Fuses act slower than the circuit breakers, consequently the motor will suffer by reason of an overload. When fuses blow out an inexperienced hand should not attempt to replace it, because there is danger of a shock from the fuse clips and a burn, if the fuse should blow out again. The advisable thing to do is to open the switch, which will stop the motor, and then bring an electrician on the job who can handle these matters without risk of danger.

This brings us down to the last point in connection with the use of electricity in manufacturing plants. The portable electric lamp is now made use of in most shops where a man shifts his working position frequently. The work is generally such that the stationery lamp will not provide the proper light at the point where he next intends to work. In the use of the portable lamp there is this danger to guard against, that of the insulation wearing off the wire. This is mostly the case near the socket. Especially in shops where the lamp is connected to a 200 or 250 volt power circuit accidents often fatal have been caused in that manner.

This instance again calls attention to the fact that guards are only a part of the means for preventing accidents, and that care on the part of the workman is an important factor in maintaining safe conditions. Before using such accessories, as portable lamps, it is advisable to inspect the wiring and connections before proceeding to work.

DANGERS IN FORGE SHOPS.

Burns and bruises are two of the most common forms of accidents in forge shops and most smiths accept them as necessary evils.

Mistakes have often caused burns, as when a smith attempts to pick a piece of hot iron or steel off the floor, because it has the appearance of cold metal.

Sparks from hot metal are another source of danger to the men in forge shops. When taking a piece of iron or steel out of the fire the smith will invariably tap it lightly on the anvil to knock off the oxide. Despite this precaution sparks will be showered in all directions at the first blow of the sledge. Of course, large sparks lodging in ragged cloth-

ing will burn the skin or set fire to the clothing. As a protection against sparks smiths use leather aprons.

All smiths wear aprons to protect their bodies, but inconsistently enough very seldom protect their eyes. While the burns on the body may heal quickly under proper treatment, a spark in the eye may cause its destruction. This applies also to workers on drop-hammers which deliver heavier blows and produce sparks with much higher speed, so that even the smaller sparks cause a hot stinging sensation when striking the body.

Burred tools are frequently responsible for many accidents. The repeated blows to which tools are subjected by the sledge-hammer may cause burrs to fly and inflict an injury on some nearby workman.

The iron and steel industry has experienced great changes since the advent of the drop or stamped forgings. Forgings of this kind can be turned out more quickly and more cheaply than castings. The uniformity in dimensions and accuracy in shape that are characteristic of such forgings adapt them for economical machining or finishing.

There are two common types of hammers, the broad drop-hammer and the steam hammer. The former is more generally used for small forgings, while by the use of the latter, large pieces are turned out more satisfactorily. Hydraulic presses are used to advantage on large forgings, plate work, such work in which bending operations are prominent. These presses often accommodate pieces several feet in length and of greater massiveness than can be handled by drop-hammers.

Solid concrete is now employed as foundations for drop-hammers and results are better than with the older type having a certain amount of resiliency. The claim is made that a drop-hammer on a concrete base accomplishes better results than a drop one-third longer on the old type.

Suction systems to remove the scale from the dies will be found in the modern drop-forge shops.

Single-frame steam hammers involve operations of a most hazardous nature and possibilities. Often the steam throttle lever is so located that one arm of the operator obstructs the view of his work, while with the other arm he is expected to adjust the controlling lever. In order to avoid this the operator is obliged to stoop over in an awkward position, and possibly then the view of his work may be poor. On account of the thundering noise around a battery of these hammers, instructions are difficult to give or understand. But the new designs of steam hammers have done away with much of this danger by placing the controlling lever and the throttle lever on one stud, a rod forming the connection between the throttle lever and the steam valve. Under such conditions the workman can control both levers with his hands below his head and he can see the progress of his work.

Many accidents are caused by cold-press work and the trimming of forgings, of like causes as those happening on punch presses, when fingers and hands are crushed. The monotony of placing forgings in trimming dies causes fatigue and it often happens that an operator does not properly place a forging in the die. In instances like this the operator will invariably try to correct the error, although the lever has been tripped to let the hammer fall, when an accident is sure to follow.

Still another source of danger in forge shops is brought about by the use of cyanide of potassium for case-hardening. This substance is

one of the most deadly known poisons and through ignorance on the part of the workmen may be taken into the mouth or inhaled in the form of fumes. Hoods should be provided to remove the fumes that are produced when working with cyanide.

GUARDS.

All guards around dangerous machinery, stairways, platforms, shafts, and passageways should be made of material selected for strength and effectiveness. In ordering guards this department has no power to specify of what material the guard should be made, as long as the guard is adequate and effective.

However, when the advice of the department is sought on this subject it will not hesitate to state which materials are preferred.

In the past, while the subject of guarding against accidents due to dangerous machinery was new, wooden guards were invariably made use of, because wood was easy to obtain in almost every manufacturing plant and demanded comparatively small expense. Every shop usually employs some jack-of-all trades or handy-man, to whom the matter of making guards has been assigned. When an immediate necessity exists for the installation of a guard at some hazard-point, it is advisable to use wood, which may be replaced as soon as the materials for metal guards are obtained. Often metal guards or material for making same require considerable time before being available, and therefore the wooden temporary guard should be installed for, if no precaution is taken until wire mesh or sheet metal arrives, it is quite possible that an accident might take place in the meantime.

In speaking of any advantage that the wooden guard possesses over the metal guard, it might be suggested that there is none, except cheapness. At present almost all guards are constructed of wire-mesh, sheet metal or perforated steel. Wood when exposed becomes splintered or broken and nails and screws are apt to work loose permitting clothing to be caught. From the viewpoint of a fire-hazard wooden guards do not recommend themselves. It would be folly for a firm, which has an otherwise fire-proof building, to install wooden guards and thereby increase its insurance rates. Moving into a fire-proof factory building would be the elimination of one hazard, while employing wood for the construction of guards would simply mean the introduction of another.

Where railings are necessary metal pipe rails, or railings composed of angle iron should be used because of their great strength and durability. The tendency at present is to use metal exclusively for all forms of guards and inclosures. Expanded metal, wire netting and perforated steel requires practically no expense for maintenance and the ultimate cost of guards constructed of any of these metals will probably be no greater than that of a wooden one.

The construction of every guard should be based on these essential points; durability, accessibility for lubricating, cleaning, and inspecting purposes, and security from the fire-hazard.

CONVEYORS AND CRANES.

The commonest types of conveyors are those operated by belts and by chains and the danger to the workmen in connection with these is considerably less than in the use of cranes.

Belts are usually made of rubber or canvas, or, of a combination of the two so that they will conform to the shape of the supporting rollers. When it is necessary to transport materials at an angle exceeding 24 degrees conveyors of the chain and bucket type are usually used. The bucket variety consists of two parallel endless chains held apart by bars, to which small rollers are attached for running upon tracks. Generally every alternate link, which is quite long, carries a bucket, which turns on its axis, thus remaining constantly in an upright position. At the discharging end the buckets are dumped by a tripping device that catches on cams on the sides of the buckets.

Many sources of danger arise in the operation of conveyors. There are many moving parts in connection with conveyors, in which employees may have their clothing caught. Stepping across moving conveyors or riding on them is dangerous practice. Every conveyor should have a railing to guard persons from coming in contact with it.

At points where conveyors pass from one floor to another, railings and toeboards should be provided. Many of the accidents in connection with conveyors are due to the negligent manner of operating them, either by overloading, or by placing articles on in an unsafe manner, or by speeding the belt up, or by starting the machinery while repairs are being made. When conveyors pass over places where men and women are at work, screens should be placed beneath the conveyors so that falling articles may be caught and prevent them from doing any damage. For the purpose of stopping the conveyor machinery instantly in case of accident, devices should be installed at numerous places along the route of the belt.

For the larger and heavier classes of work cranes are employed and for that reason so much more danger is involved in their operation. There are several kinds of traveling cranes, the monorail hoist being the most recent of this type.

Although European authorities consider cranes as the source of more accidents than any other one type of machinery, it is unusual for an operator of a crane to be injured. In the modern method of constructing cranes almost every safety factor has been considered for the protection of the operator. Accidents generally occur to those working in connection with crane operations or to such as are engaged on other work, but in the path of the crane.

Accidents often happen, when a man attempts to make a short cut under a load that is suspended in the air, or when a man tries to pass through a narrow space between the load and the wall. Another source of accident is the boarding of a running crane by an employee other than the operator and during or after the making of repairs. When repairs are necessitated the crane should be run to the end of a shop and all power switches shut off or, if other cranes are in use on the same runway, then safety bumpers should be placed at each end of the broken down crane to prevent a collision.

The entire lower side or bottom of a trolley should be enclosed, so that no loose parts may fall on employees who may be working below. Truck wheels should be provided with guards to protect any person who may be working upon the tracks. A steel platform, equipped with railing and toe-board, should be used on the top of the crane and the use of

all woodwork prohibited, because it may become oil-soaked, creating a fire-hazard for the craneman.

No person should ever be permitted to ride on the load nor on the slings or hooks. Slings, chains, cables, or hooks should never be allowed to drag along the floor of the shop, be the distance ever so small that the crane must travel, because a sling or hook might attach itself to some object tearing it along or throwing it over.

Many accidents are caused by trying to straighten a load by jerking, or swinging it against some object. In cases of this kind, when the load needs readjusting, the load should be lowered and the slings adjusted in the proper manner. Swinging or jerking a load may cause it to strike some part of the work on the floor or of the building, or snap the chains or cables. The safest way is for the craneman to lift a load not more than a few inches off the floor to determine whether it is well-balanced, more specially so in the case of handling receptacles of molten metal.

The most dangerous type of crane is the magnet crane; which does not hold the load by means of slings or chains, but by the peculiar force of magnetism. With this type of crane electric current is used. Should the current weaken or falter for just a moment the whole load held by the magnet will be released and crash down without a moments notice. The current supply for a magnet crane should be entirely independent of all other power circuits. But the safest method is to avoid the installation of magnet cranes in the inside of buildings, especially where the load must pass over workmen below. The magnet crane without a load is a dangerous proposition as long as the power is on. If a man carrying steel or iron on his shoulders should pass under the magnet, he might be drawn up to it. Another danger then arises, that of dropping the man with the material which he carried, if the craneman should turn off the current.

When handling truck loads of material, or loads of any kind that may slip out of the slings from vibration or other causes, it is advisable, especially if the floor of a shop is filled with workmen, to have one man precede the crane and warn all those near which the crane must pass.

Hooking or unhooking of loads often occasions accidents. Very often after applying the hooks to a load a workman will hold on to them with his hands until the slack of the hoisting cable is taken up. Safety handles attached to the hooks or the use of notched pieces of wood will avoid the crushing of hands and fingers, when a man misjudges the point of contact and the angle which a hook makes with the load the instant the weight is lifted. After the hooks and slings are in place and the slack is taken up, workmen should walk away from the load and keep several feet in the rear of it.

All sheaves or blocks to which the hook is attached should be so enclosed, that a workman will not have his hands drawn into the sheave when slackening off the cables. Trying to loosen a cable by pulling it down on the inrunning side of the block should be avoided. A safer way is to grasp the outrunning side, and pull up and away from the sheaves.

When chains or cables are being drawn from under a load, the workmen should stand at a distance. It often happens that a chain catches on some part of the load and throws it over, the action being so quick

that the men have little chance to run for safety. On the other hand, the chance is that a chain becomes fast to a part of a load, but not securely enough to throw it over, and as the steady pull on the chain releases it from the load, the chain is apt to snap away very suddenly and with violent force. Should the link of a chain happen to hit a man on the head under such circumstances, the accident would result in the death of the workingman.

SAWDUST AN EFFICIENT AND CHEAP FIRE EXTINGUISHER.

In the eighty-seventh number of the "Zentralblatt fuer den Deutschen Holzhandel," 1913, on page 880, we find an interesting article on the use of sawdust as a fire extinguisher, the gist of which is offered here for the benefit of owners of the large number of woodworking establishments in this State and others, who are looking for a cheap and efficient fire extinguisher.

Sawdust is particularly well adapted for extinguishing small fires in oils and other inflammable liquids. When light oils, as for instance gasoline, are aflame after having been spilled on the floor, sawdust may be used successfully in quenching the fire, but when gasoline is ablaze in a tank it has little value, because sawdust sinks to the bottom and cannot be spread over the surface. In the case of heavy oils, lacquer, japan, and melted wax it forms an effective blanket on the burning surface.

Sawdust smothers the flames by excluding the air. Oxygen aids combustion and when the sawdust particles pack together closely forming an air-tight blanket, combustion must cease. This is the entire secret of the fire extinguishing properties of sawdust.

The value of sawdust as a fire fighter can be greatly increased by adding a certain amount of bicarbonate of soda. This substance when exposed to heat produces carbon dioxide gas, which assists in preventing the access of air.

Sawdust should not be too fine, and in case of a fire should be spread very rapidly, so as to blanket an entire surface. Sawdust of any character is equally effective, whether wet or dry, whether from hard wood or soft wood.

Perhaps this method of fire extinguishing will appeal more readily to owners of sawmills, where sawdust collects in considerable quantities. In this connection the suggestion is made to sprinkle sodium bicarbonate in the sawdust piles in order to assist in checking the combustion, should a pile become ignited.

RESULTS OF INSPECTIONS ACCORDING TO THE PROVISIONS OF THE WASH HOUSE LAW.

The following table shows the results of inspections in the enforcement of this law.

Two hundred and thirty-seven establishments were inspected in Chicago and Cook County and 154 in the 54 cities and towns outside of Cook County. Two hundred and thirty-seven of these places of business received orders to install washing facilities. The table is divided

into 17 industries and shows the number of establishments in each industry in which after inspection it was found necessary to install wash-rooms.

RESULTS OF INSPECTIONS ACCORDING TO THE PROVISIONS OF THE WASH HOUSE LAW.

July 1, 1915, to June 30, 1916.

Location.	Number of inspections.	Employees.	Number of orders issued to establishments classified into following industries.																
			Foundry and boiler shop.	Machine and blacksmith.	Railroad shop.	Public utilities.	Clay products.	Smelters.	Steel mills.	Flour grain and feed.	Auto and carriage.	Packers.	Leather products.	Sheet metals.	Metal specialties.	Pulp products.	Farm implements.	Electric appliances.	Wood products.	Miscellaneous.
Chicago and Cook County.....	237	31,420	43	55	7	1	7	4	13	4	5	22	10	11	1	7	5	42	
Alton.....	4	700	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Amboy.....	1	76	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Anna.....	1	23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Aurora.....	12	665	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Batavia.....	1	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Belleville.....	3	59	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Beloit.....	1	41	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bradley.....	2	139	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Beardstown.....	1	311	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cairo.....	1	27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Carlinville.....	1	12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Carlyle.....	1	41	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Christopher.....	1	26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Davis Junction.....	1	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Decatur.....	9	1,385	1	3	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1
East St. Louis.....	28	1,921	1	1	18	1	1	1	1	2	1	1	1	1	1	1	1	2	3
Freeburg.....	2	34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Freeport.....	9	1,470	1	7	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Galesburg.....	3	166	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Galva.....	2	168	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Geneva.....	1	76	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Harrisburg.....	2	59	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hillsboro.....	1	32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jacksonville.....	1	53	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Joliet.....	13	6,057	3	3	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1
Kewanee.....	2	56	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
LaSalle.....	1	24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lawrenceville.....	1	31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lenox.....	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Macomb.....	3	220	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mattoon.....	2	438	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Metropolis.....	1	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Momence.....	1	34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Montgomery.....	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mounds.....	1	35	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
National Stock Yards.....	3	1,525	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
North Chicago.....	1	155	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
New Athens.....	1	67	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Olney.....	1	43	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
O'Fallon.....	2	207	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Peoria.....	11	1,317	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Peru.....	1	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Robinson.....	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rockford.....	5	647	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Springfield.....	3	129	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Spring Valley.....	1	12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Streator.....	1	18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
St. Anne.....	1	30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tamms.....	1	42	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Taylorville.....	1	40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Utica.....	1	31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Waukegan.....	1	47	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Woodstock.....	1	1,450	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Zeering.....	1	14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	391	51,974	62	87	49	7	13	5	18	11	8	3	22	15	11	4	5	9	53

Certain standards have been established for compliance with this law. Spigots providing hot and cold water must be installed in the proportion of one to every five employees quitting at the same time in such industries that are extraordinarily dirty and dusty, such as blacksmith shops, foundries, boilershop, and mills.

Three drawings herewith reproduced show the standards adopted by this department for the construction of washhouses, the first having accommodations for one hundred men, the second for two hundred men, and the third of one hundred unit for the accommodation of two hundred men of a continuous day and night shift. One of the main features to be observed in the plans is the entire separation of the toilet facilities from the rest of the washroom. Toilets must be provided for in the proportion of one toilet for every 30 male employees. The drawing shows the arrangement of the wash troughs and indicates twenty spigots for the use of



Figure 23. Sanitary wash room with adequate facilities.

one hundred men. The lockers, one for each employee, must be located in close proximity to the wash troughs. The fourth drawing presents a sectional view of the locker arrangement. In front of each row of lockers a bench is built, so that the men may dress and undress conveniently. As a rule the heating pipes are laid underneath this bench, which serves a double purpose: the bench being open in front allows the heat to penetrate the room, and, on the other hand, by means of port-holes in the top of the bench opening directly into the bottom of the lockers provision is made for the drying of the clothes, which are suspended from clothes hooks.

In all floor plans of washrooms particular thought has been given to the spacing of washtroughs, lockers, etc. No crowding will be permitted and the aisles must be of ample width to accommodate the number of men without inconvenience.

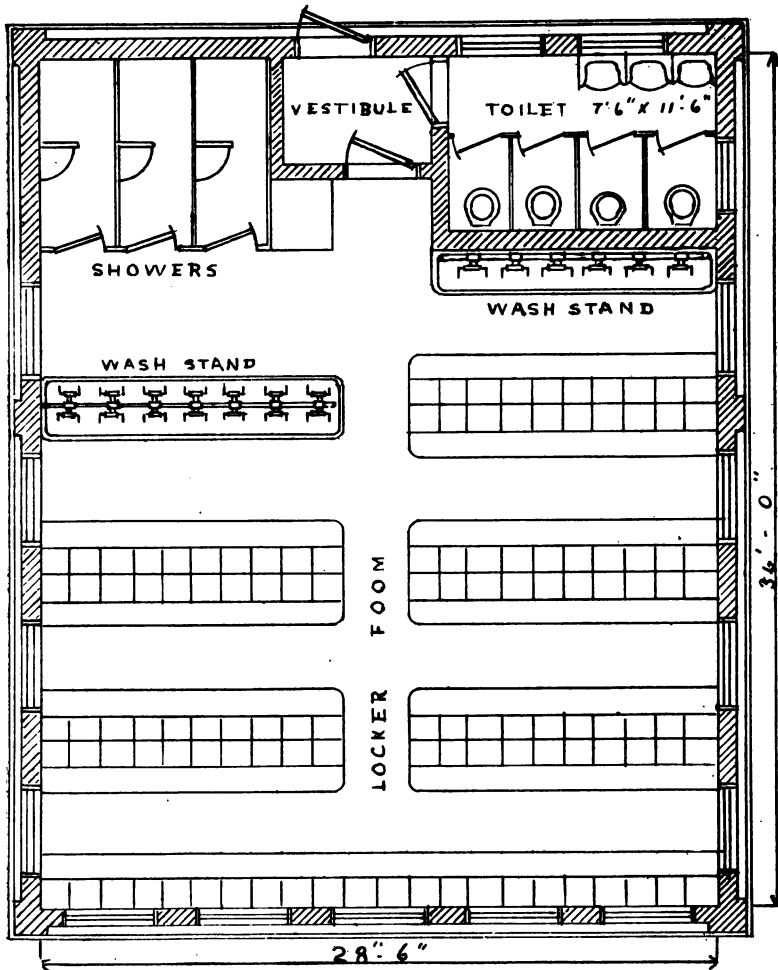


Figure 24.

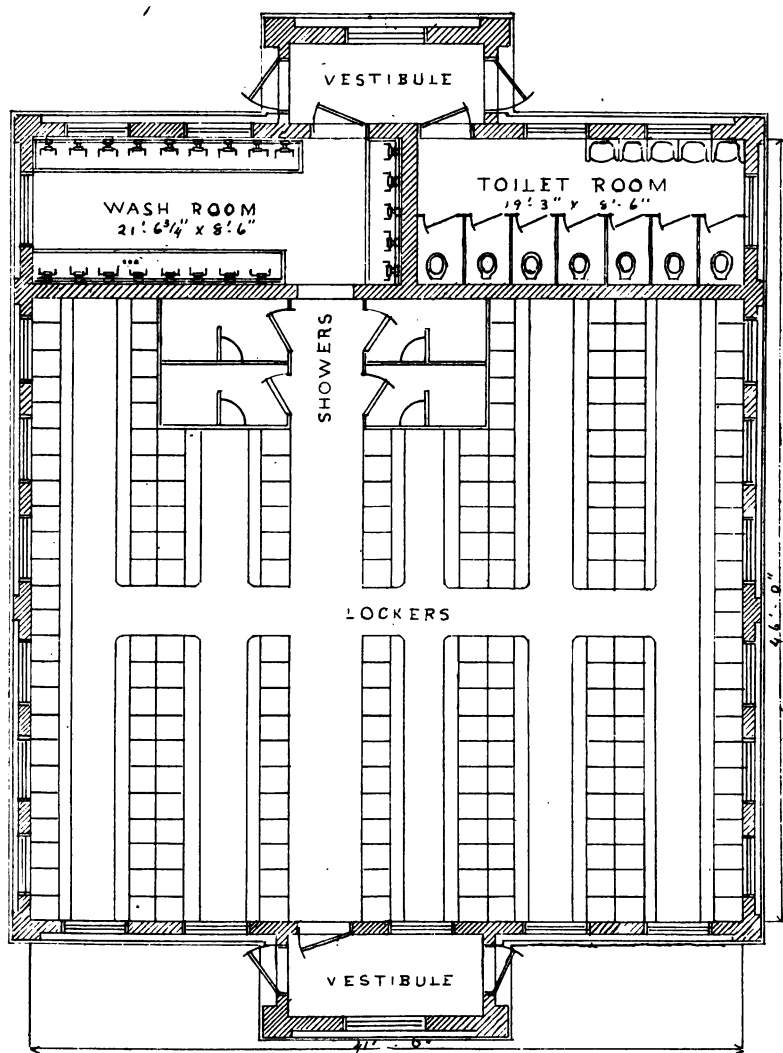


Figure 23

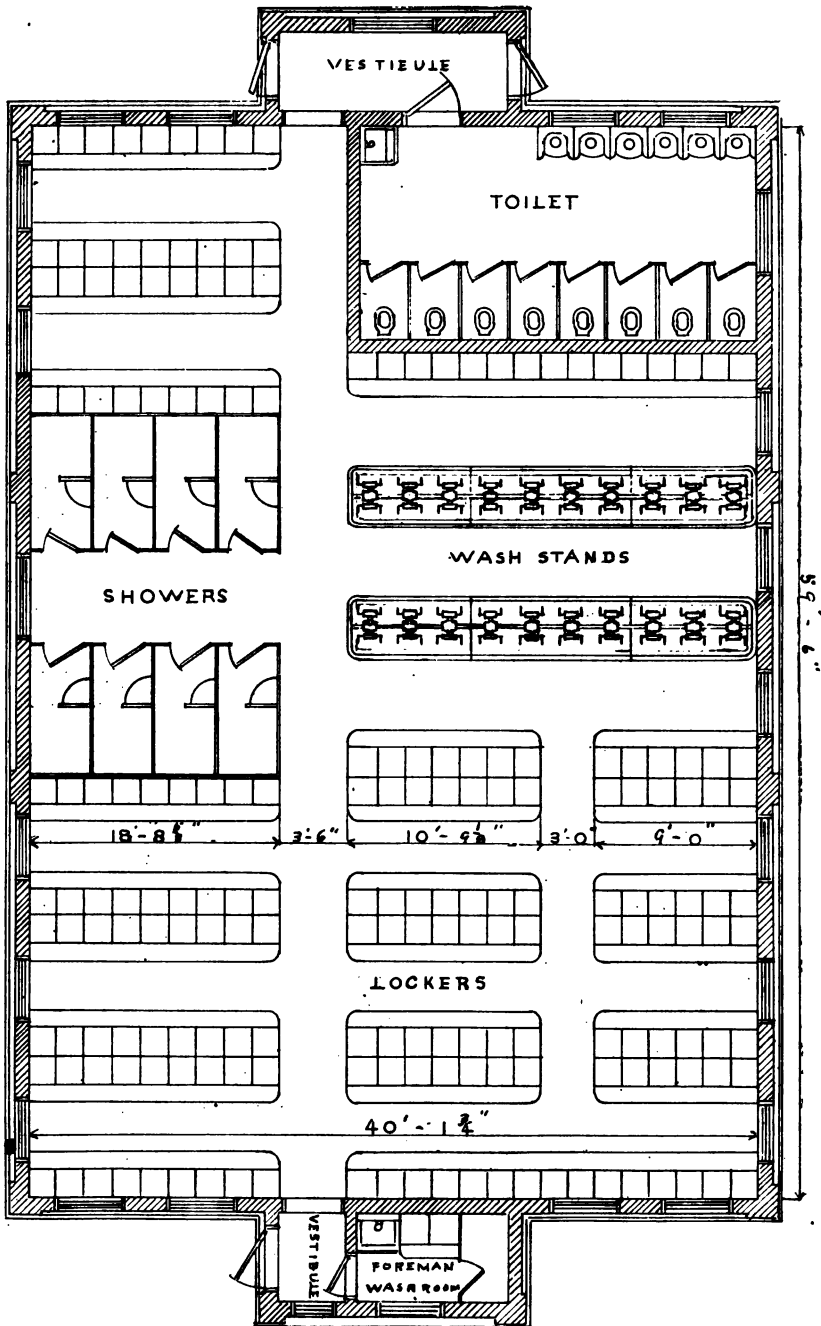


Figure 26.

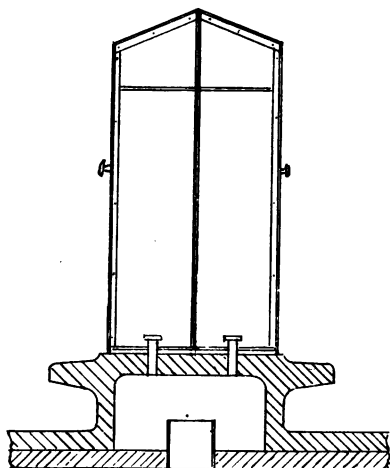


Figure 27. Locker mounted on concrete base with hot air ventilation.

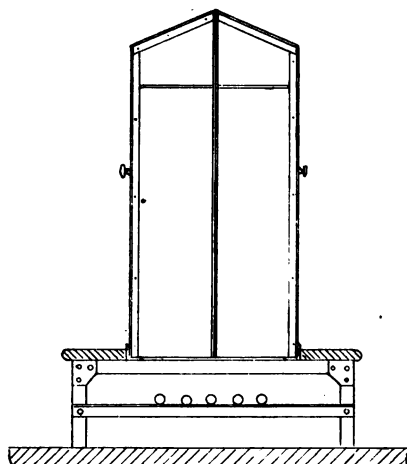


Figure 28. Locker mounted on structural base with heating pipes installed underneath.

OCCUPATIONAL DISEASE INSPECTIONS AND MEDICAL INVESTIGATIONS.

A SURVEY OF THE OCCUPATIONAL DISEASE SITUATION.

By Harold K. Gibson, M. D.

The Occupational Disease Act of Illinois enacted by our Legislature in 1911, was designed for the purpose of protecting employees in certain industries deemed extra hazardous or hazardous by the State. Preliminary to the enactment of this legislation, the subject of industrial disease in its relation to the employee, factory hygiene, and the best methods of prevention or the reduction to a minimum of industrial disease, had been the subject of a most thorough and painstaking investigation by the commission composed of representative physicians, chemists, and industrial hygienists, each of whom was selected for his peculiar fitness and knowledge of the subject under consideration. This act has now been in operation for a period extending considerably over four years and in a survey of its enforcement and the results obtained during this period we may, with a fair degree of accuracy judge of its value as an asset to our entire scheme of social legislation in this State. Let us admit frankly from the beginning, that admirable though its provisions are in our estimation, it loses much of its power for good not through any of its provisions per se or from any lack of breadth, but from the omission of certain correlative legislation. Broad as is its scope in so far as industrial poisons are concerned:

SECTION 1. That every employer of labor in this State, engaged in carrying on any work or process which may produce any illness or disease peculiar to the work or process carried on, or which subjects the employees to the danger of illness or disease incident to such work or process, to which employees are not ordinarily exposed in other lines of employment, shall, for the protection of all employees engaged in such

work or process, adopt and provide reasonable and approved devices, means or methods for the prevention of such industrial or occupational disease as are incident to such work or process.

We find that the practical application of the act reaches a relatively small proportion of those employees it was designed to protect and we realize that a great many industrial poisonings occur outside of the jurisdiction of this department. As a concrete example, let us consider the subject of plumbism, by far, and away the most important and far reaching in its effects, the more so from its diversified uses in the trades. In the State of Illinois we have perhaps 28,000 journeymen painters over which the department has no jurisdiction. There are in the State four large plants engaged in the manufacture of white lead, many phases of which are particularly hazardous. Now the total of these employees who are employed under the provisions of the Occupational Disease Act and from whom we receive monthly reports from the physicians, amounts to 2,000 employees which figure is relatively small as compared to the 28,000 painters and the incidence of plumbism among whom we have no means of estimating, other than the investigation of hospital cases which are but an infinite fraction of the total. In one instance where a systematic and careful physical examination was made of one hundred painters of a local organization, an astoundingly large number of the men showed evidence of plumbism. The causes of the incidence of plumbism among the journeymen painters are not difficult to ascertain—first, an entire absence of personal supervision of the employee as regards adequate working facilities, time allowed for washing and medical examinations. In the above instance we have an example of a statute whose provisions in themselves leave little if anything to be desired in so far as the individual is concerned, fail partially in its mission of preventing industrial plumbism, the most frequent and disastrous in its effects of any of the industrial poisons; by reason of its inability to reach the greatest number of those employees concerned; in that it, the act applies only to the workshop and factory. We believe that the compulsory reporting of all industrial disease by all physicians irrespective of the place of its acquirement, would be a greatly desired step in the right direction. We are convinced not only from our own experience, but a careful study of industrial disease reports from abroad, and we have repeatedly urged in our bulletins and reports that the present Compensation Act in force in this State, be so amended as to include in its scope those workmen disabled in the course of their employment, not only from accident as defined by our act in its strictest sense, but absolutely due to disease incurred in the course of employment as well. Let it be remembered that there was no compensation for workmen disabled from disease in England until 1906. At the present time no state in the Union has a Compensation Act of sufficient breadth to include the industrially poisoned. We feel convinced that only when our Compensation Acts are so drawn as to include these unfortunates, and only then, will our legislation to further human conservation, bear its full fruit. True enough the industrial boards of several states have interpreted the word "accident" as applying to industrial poisoning, yet these definitions have been invariably reversed by the higher courts. That the entire subject of compensation for industrial disease is a most complex one and

fraught with many difficulties in its administration, we readily admit, but we must repeat if it is sound economics to accept the precept that all risks incurred by the workmen of our country in carrying on its industries, should in the first instance be a charge upon production—that is to say, the employer, in order that they may be borne by the community at large, then the principal of compensation for an industrial poisoning is a valid one. As our act is at present construed, we find that an ever growing number of those who have become afflicted with plumbism seeking redress in civil actions against their employers or a charge upon the community as inmates of one of its charitable institutions. It should be borne in mind that the victim of any of the more severe types of plumbism such as paralysis, arterial sclerosis or nephritis is no longer an asset in the industrial world. In this connection, it might be pertinent to refer to the present status of plumbism in the painting trades. We believe it an indisputable fact that there will inevitably be a certain number of cases of plumbism among the journeymen painters as long as the present use of lead containing paints is continued in interior of decorating in the present unrestricted manner. That the zinc whites and various other non-lead containing paints could at least be substituted in a large percentage of the interior work, has been amply demonstrated by the experience in European countries, notably France, where the Government has eliminated lead in all interior work. In general, it may be said, that legislation in Europe in so far as lead is concerned, is much more drastic than our own, which almost seems primitive as compared with that of France, Germany, Austria, Sweden, indeed every European country. We have frequently been informed by painters who have served their apprenticeship abroad, that they had never used lead containing paints in interior work until coming to this country. The greatly increased use of white as an interior finish particularly in the large office buildings, necessitating the use of the various varnishes and enamels, these with their dryers of the benzine, and naphtha group, have wrought havoc among the workers. This department has investigated a number of accidents among painters, in particular, falls from ladders and scaffolding and their resulting injuries—in many instances the painter experienced a momentary vertigo or dizziness just before the fall, and we realize in the light of our present knowledge of the notorious toxicity of methyl alcohol, benzine, naphtha, aniline oil, and their derivatives and compounds, that an untold number of accidents occur yearly throughout the land from the inhalation of the toxic fumes above mentioned. Unfortunately, we have no available statistics in any quarter as to the accident percentage among painters by reason of falls, but we believe that such figures would be surprising. Let it be remembered that this work is always carried out in rooms almost devoid of ventilation, artificial or natural, and the fumes from these toxic chemicals have been proven highly poisonous. We believe the time is at hand when our Government, State or Federal, should place certain restrictions upon the manufacture of this class of paints as regards their toxic elements. There has been entirely too great a tendency to attribute this class of accidents to alcoholism. It should be no more possible nor legal to allow a painter to suffer a fractured hip or skull by reason of his working (often without his knowledge) with a dangerous chemical, (and this most frequently

in a room devoid of ventilation), than it is legal or possible to expose this same painter to a fall from an unguarded scaffold. That we would have much to hope for from the legislation of this character, cannot be doubted after witnessing the results of the Federal legislation in abolishing the use of white phosphorus in the match industry and the disappearance of "phossy jaw" (phosphorous necrosis). We confess to a feeling of pessimism in so far as any substantial reduction of plumbism among the vast majority of those most concerned, whom as we have previously stated, are beyond the jurisdiction of this department, unless there are some restrictions put upon the employment of lead, particularly in inside work. A certain painters' organization in this State, weary of what they considered an abnormally high percentage of accidents from falls, and the ensuing sick benefits, brought to the department a sample of an interior finish much in use, which we will designate as "Perfect Finish," because this was not its trade name. The men almost without exception, after any continued exposure to the fumes of this particular finish, complained of varying degrees of vertigo, black spots before the eyes, and dizziness. Consider for a moment, how even a momentary dizziness increases the hazard of the man working on a ladder or scaffold. In the above mentioned case, the painters finally refused to work with this enamel. If we have devoted a seemingly considerable space to this subject, it is in the keen realization that it calls for speedy and drastic action for the elimination or reduction to a minimum of the exceedingly toxic elements in this class of paints.

PRINTING TRADES.

In former times, before the general introduction of the linotype, plumbism was not uncommon among compositors, as the type metal through its rapid oxidation, deposited more or less dust in the type trays, and the solubility of this dust or oxide in the human system, gave rise to plumbism not infrequently. We may mention that during the past year we have investigated several undoubted cases of plumbism in the printing trades. We feel that to enforce the Occupational Disease Act in its entirety upon every printing shop in the State, would impose a needless and unnecessary hardship upon the printers. However, we have insisted upon adequate ventilation and the elimination of all fumes from the metal pots of the machine.

While all legislation may be spoken of as educational, we feel that the Occupational Disease Act is peculiarly so. Paramount, though adequate lavatories, ventilation, and dining rooms may be, the employer will fail in the prevention of industrial disease unless a sufficiently high standard of shop discipline is maintained in an intelligent enough manner to secure a proper attention to personal hygiene among the employers. No amount of legislation can compel a workman to wash his hands before eating or to take a bath after several hours of dry sanding, even though the factory be more than adequately equipped with shower baths, but an intelligent foreman can accomplish these things and more. During the early period of the existence of the Occupational Disease Act, the stock argument of the protesting employer, who let it be said in all fairness, was in the minority, "my men will not use the shower baths." Go into any modern plant equipped with showers today and ask the foreman if the

men use the showers, and note how regularly the reply is in the affirmative; if it is not, nine times out of ten it is because the lavatory is maintained in a filthy condition or the company expects the man to take his bath on his own time. From the standpoint of preventive medicine, the importance of the shower bath to the workmen in the dusty trades can scarcely be exaggerated. All medical men of today are unanimous as to the necessity of good elimination by both skin and kidneys in the prevention of all disease, and how particularly does this apply to plumbism. In this State, the foundry, the paint and dry color factories, the zinc and lead refineries, are amply equipped with shower baths. It is pertinent in this connection to refer to one of the newer legislative acts in this State—i. e. the so called Wash House Act. We believe that the importance of this single piece of legislation to the workingmen cannot be over estimated. Let it be taken into consideration that the great majority of our workmen's homes are not equipped with adequate lavatories—much less shower baths. The entire subject of housing has not thus far received the attention it merits in the general effort toward human conservation. We have several large plants in this State where commendable efforts are being put forth in this direction, and we hope that in the future it will be recognized and appreciated that many cases of tuberculosis have their inception not in the well ventilated factory with its lavatories and dining rooms, but rather in some tenement lodging house with its absence of sunlight and ventilation. During the past summer the writer was engaged in inspecting a large spelter furnace. When the shift took place, without exception the employees filed straight to the shower baths. How many of these men, even granting that the home provided baths, fatigued after the hours in a superheated atmosphere, would have taken a bath after reaching home. That the bath is considered an asset in promoting industrial efficiency, is evidenced by the fact that many of our large manufacturers, even those to which the Occupational Disease Act is not applicable, have installed adequate lavatories and wash rooms equipped with showers. To the foundry worker—whether brass, iron, or steel, or the worker in the dusty trades, the importance of the modern washroom as a health asset, cannot be over estimated. In this connection, we wish to speak of the situation as regards provision of suitable places for the taking of meals outside workrooms. In this particular, our Occupational Disease Act is clear, and when it is found necessary to issue an order, the section referring to dining rooms is worded as follows: "You must not permit any employee to take any food or drink into any room or apartment where (here the dangerous processes are specifically named), nor shall you permit any employee to remain in any such room or apartment during the time allowed for meals, and you must make provision for such employees taking their meals elsewhere." This is an important provision of all Occupational Disease orders used by this department. Let it be said in all fairness to the manufacturer, that an ever increasing number irrespective of whether the law applies to their particular industry, are providing dining rooms of their own initiative. This in itself tends to spread the desire among the employees of other establishments for such an important health aid.

We have in mind one large paint and dry color factory in this State where a model dining room was built for all employees, and food fur-

nished at cost. However it was found necessary to build a second dining room for workmen of the paint and dry color departments, as these men objected to going to the dining room in their overalls. In some localities where much of the unskilled labor is colored, the additional expense to the manufacturers of building extra lavatories and dining rooms, may be imagined. In general, the complaint so frequently voiced by the employer in the early period of enforcement of the Occupational Act, that the men preferred to take their meals in saloons, is much less frequently heard. Only on one occasion in the past two years has it been necessary for the department to institute prosecution under this section of the act. In the instance referred to, the firm, fortunately the only one in the State, employed girls in the dusting of china powder upon lithio transfers, a notoriously hazardous process for men, and particularly so for immature girls. Our inspector found the girls eating their lunch in an atmosphere polluted with chromate of lead dust, this state of affairs existing after repeated warnings of the danger. We find women much more susceptible to plumbism than men. Before going into discussion of industrial disease legislation in the different states, let us recapitulate concerning the shortcomings of our legislation. Of primary importance, we recognize the necessity for the general compulsory reporting of industrial disease by physicians and hospitals irrespective of whether it occurs in a shop or factory, or as it usually does in some journeymen painters, engaged in decorating the interior of a building. After four years of experience with occupational disease reports, we must plead the utmost skepticism as to the value of these reports as criterion of the number of individual cases of plumbism occurring in the State. With the exception of a few of the larger plants, the examinations are conducted in a too perfunctory manner to be productive of a lineal diagnosis excepting in well marked cases. Undoubtedly the employee, fearing loss of time, will deny the existence of the early subjective symptoms to the company physician, and when taken actually ill at home, sends for an outside physician, thus passing from the supervision of the company physician, and incidentally his report to our State Board of Health. When the greatly to be desired time arrives, when the occupational diseased workman receives the benefits of his co-worker under the Compensation Act, who happens to be disabled from accident and not poisoning, an occupational poisoning in the language of one distinguished jurist being "foreseen and therefore not an accident" then and not until then, will we have dependable occupational disease reports from the employer. That this will entail a hardship upon the physically unfit, cannot be denied, as the employer for his own protection, will make it purely a case of "Survival of the Fittest," but that compensation for the occupationally diseases, would be a measure of inestimable value to the great scheme of human conservation, cannot be denied.

THE OCCUPATIONAL DISEASE CLINIC.

By George L. Apfelbach, A. B., M. D.

PURPOSE.

During the previous year an "Occupational Disease Clinic" was organized, located in the medical room of the Illinois Department of

Factory Inspection, where clinics are held daily, except Saturday, from 2 until 4 p. m. The idea was borrowed from Italy, where in Milan a clinic was established several years ago open to all people for the purpose of ascertaining whether there exists any possible reason for illness due to occupation. The Occupational Disease Department has grown so rapidly the last four years that it has not only attempted to regulate such industries as are specified in the law, but also to give such service to the public at large that may result in the detection of occupational disease among workers not covered by the act, and also to ascertain the existence, if there be such, of other occupational hazards not recommended by the commission of 1911 and enacted in the law of 1912. Moreover, as is well recognized, there are faults in the law which prevent the complete protection of the public from industrial disease. Such, for instance is the fact, that many cases of industrial poisoning are not reported to the State Board of Health. Should there ever be opportunity for further legislation on occupational disease, this department strongly recommends that the reporting of industrial diseases be made compulsory upon physicians practicing in Illinois. There is no more reason for reporting contagious diseases to a municipal or State bureau of health, than there is for reporting such diseases as occur in the course of occupation of citizens of this State. Because all cases of occupational diseases are not by law reportable, the Department of Factory Inspection has found it expedient to offer to the public a dispensary where a medical examination can be obtained and where physicians, having had five to six year's experience in this branch of public health service, are enabled to step in, help the worker and prevent further illness to employees in such industries. Thus the clinic not only is a help to the public directly, but enables the department to ferret out, with absolute proof, establishments or industries where occupational disease occurs.

OPERATION.

Upon the establishment of the clinic, letters were sent out to such public health organizations and others interested, as for instance, the Visiting Nurses Association of Chicago, the United Charities, the Immigrant Bureau, the Legal Aid Society, the Public Service Department of Cook County, all labor unions, all free dispensaries, medical schools, United Jewish Charities, the Cook County Agent's Office, etc., etc., to send in all suspected cases of industrial disease. It has been encouraging to observe the interest taken by above institutions in this branch of work of the Department of Factory Inspection. Most gratifying is the attitude taken by such labor organizations as the various painters' unions, typographical union, photo-engravers, etc. Whenever such organizations send in patients to the clinic, should occupational disease be found, an inspection of such establishment is made by one of the doctors to remedy hazards that exist and prevent further illness. It is unfortunate that the Occupational Disease Law does not cover all workers in trades. However, it is the desire of this department to extend to such workers in hazardous trades, all aid possible by means of this clinic and also by public lectures on industrial hygiene. The eagerness with which trade organizations and other individuals in factories and mercantile establishments seek the services of this occupational disease clinic, expresses

to this department a certain feeling that there is a demand by the public for health protection in their occupation. Let this point be suggestive to our future legislative assemblies.

OBSERVATIONS MADE.

Since December 1, 1915, 257 men and women have been examined. The largest number came directly from painters' unions. On other pages of this report will be observed statistical data resulting from above examinations made. At this point it is only practicable to point out extraordinary benefits which have resulted from conducting such a dispensary for industrial hygiene. Three persons afflicted with acute articular rheumatism made application for examination. One worked in one of the refrigerating rooms of the Union Stock Yards, another stood in about one-half inch water while at work, the third rheumatic worked in an ice-house. Not all persons afflicted with acute inflammatory rheumatism work in damp places, but it is significant enough for investigation that when persons afflicted with rheumatism, consulting an industrial hygiene investigation, reveal themselves to be working in cold damp places. It is most difficult to obtain data on the diseases of those who work in damp places. So far, following the occurrence of above three rheumatic cases, we have obtained no statistical information, but have investigated the matter at the Cook County Hospital, and by personal interview with refrigerator workers believe that we have formed an opinion which, although it cannot be corroborated by accurate data, is fairly reliable in assuming that persons who expose themselves to cold damp temperatures are liable to acute articular rheumatism and to acute nephritis. In other words, it seems that the exposure to cold damp atmospheres, lowers the resistance of the human body to infections and also that such atmosphere acts upon the skin and vasomotor system so as to increase the work of the kidney.

Many persons came to the clinic suffering with skin diseases. No law in the United States on occupational disease has ever considered the occurrence of skin diseases among workers as of much importance. In another part of this report a special article on dermatitis will show that most of these cases occurred among people working in such material which removes the natural oil of the skin. For this reason we see dermatitis frequently among workers in turpentine, as for instance, printers, painters, varnishers, also among those working in acids such as platers, photo-engravers, lithographers, etc., and among those working in sugar containing fluids, such as bakers, candy makers, those making patent medicine, and bar tenders.

The question of tuberculosis from an industrial standpoint will also be considered in another part of this report. However, we wish to state here that our clinical material has revealed that the dusty trades are redolent with tubercular persons. To anyone interested in this subject, we refer to such excellent work as performed by Dr. Scherschewsky, of the Public Health Service and to the researches of Dr. Collis, of the British Department of Factory Inspection. It will take a long time to develop from our dispensary accurate data regarding occupation and tuberculosis. It is absolutely necessary that the Municipal Tuberculosis Institutions and those societies for the prevention of tuberculosis, use more accurate methods in examining their patients.

We have suggested to the Municipal Sanitariums and dispensaries in Chicago that, if each dispensary doctor would, in taking his history, accurately determine the occupation of the patient, going even into detail as to process, that in four to five years enormous data would be collected, as regards the relation of occupation on tuberculosis. At present there is no cooperation between the tuberculosis prevention societies, municipal and otherwise, with the occupational disease clinic of the Illinois Department of Factory Inspection.

In the course of our work many so-called cases of "nervous prostration" have been observed and it is noteworthy to state that such cases seem to occur commonly in men working twelve hours per day, six and often seven days per week, in work of a monotonous character, such as running a punch press, steel mill work, further among women such as telephone operators, stenographers, typists, department store girls, box packers, candy dippers, etc., etc. Further information has not been obtained by our medical department, simply for the reason that the time required in conducting other affairs of the department relative to industrial hygiene has not permitted a more thorough investigation relative to the subject of fatigue, of which above mentioned cases are inductive thereof.

CONCLUSION.

Although the dispensary has been in operation only six months, it has proven itself so efficient in its results that further steps are being taken to increase its scope. This can only be done by advertising the existence of the clinic in the newspapers, public lectures and through the various welfare organizations. In conclusion we wish to say that the results of the examinations are on record and as time passes will furnish accurate data as regards industrial disease.

ILLINOIS DEPARTMENT OF FACTORY INSPECTION—OCCUPATIONAL DISEASE CLINIC.

Name..... Address..... Age..... Sex..... Color.....
 Nativity..... How long in U. S..... Citizen..... Civil State
 Family..... Miscarriages..... Occupation..... Branch
 of occupation..... How long in occupation..... Previous occupa-
 tions..... Education..... Father's occupation..... Occupation
 of mother before marriage..... Wife's occupation.....

Habits—Beer..... Whiskey..... Wines..... Tobacco—
 Smoke..... Chew..... Tea and coffee..... Use of meat.....
 Bathing..... Hours of sleep..... Mustache.....

Family History—Father..... Mother..... Brothers.....
 Sisters.....

Past Illnesses..... Venereal History.....

Present Complaint.

Loss of weight..... Loss of strength..... Nervousness.....
 Pulmonary—Cough..... Sputum..... Hemoptysis..... Night
 sweats..... Pains in chest.....

Digestive—Nausea..... Vomiting..... Eructations.....
 Anorexia..... Foul taste or breath..... Salivary disturbances.....
 Constipation..... Diarrhoea..... Melenae..... Hemorrhoids
 Colic..... Pain in abdomen..... Distention.....

Sensorial—Headache..... Vertigo..... Syncope..... Spots before eyes..... Insomnia..... Night-mare..... Depression..... Loss of memory..... Confusion..... Diminished vision.....

Neuromuscular—Neuralgia..... Joint pains..... Anesthesias..... Paraesthesias..... Muscular cramps..... Trembling..... General—Festering cuts..... Neuresthenic..... Itching eyes..... Tinnitus..... Heart palpitation.....

Genito Urinary—Night urination..... Incontinence..... Impotence.....

Physical Findings.

General—Appearance..... Palor..... Icterus..... Emaciation..... Prematurely aged..... Loss of expression.....

Head—Scalp, Scars..... Wens..... Bald.....

Face—Paralyses..... Scars or neoplasms.....

Mouth—Blue line..... Tongue tremor..... Loose teeth.....

Condition of teeth..... Pyorrhoea..... Coated tongue.....

Eyes—Conjunctivitis..... Strabismus..... Unequal pupils..... Argyl-Robertson..... Myosis..... Mydriasis..... Ptosis..... Nystagmus.....

Ears—Right ear..... Left ear..... Mastoid scar.....

Neck—Adenopathy..... Tumors..... Abnormal pulsation..... Thyroid enlargement.....

Thorax—General..... Pulmonary findings..... Circulatory—Heart..... Pulse rate..... Blood pressure..... Cyanosis..... Arteriosclerosis.....

Abdomen—Epigastric tenderness... Gall bladder tenderness..... Tenderness of McBurney's Point..... Liver..... Hernia..... Distention..... Operation scars..... Abdominal reflex.....

Genitalia—Scars..... Ulcerations..... Discharge..... Atrophic testicle..... Undescended testicle..... Circumcision..... Hydrocele..... Cremasteric reflex..... Enlarged prostate.....

Skin—Dryness..... Dermatitis..... Acne..... Dermographia..... Pigmentations.....

Extremities—Gouty toe joint..... Edema ankles..... Varicose veins..... Epitrochlear glands..... Signs of injury..... Nails.....

Nervous—Motor, Romberg..... Paralysis..... Coordination (finger-nose)..... Sensory..... Reflexes—Patellar..... Wrist..... Ankle..... Psychological.....

Laboratory.

Urine—Sp. Gr..... Albumin..... Sugar..... Blood..... Casts..... Lead..... Arsenic.....

Blood—Hb. (Talquist)..... Stipling..... Red cells..... White cells.....

Hand Dynamometer Test—Grip..... right..... left..... Extension.....

PAINTING TRADES.

By George L. Apfelbach, A. B., M. D.

In the past year a most thorough study of the diseases of painters has been made, not alone for the purpose of knowing the diseases of the painters themselves, but to obtain specific information as regards the health of workers in general, who are engaged in the large number of occupations where lead is used continuously in moderate quantities. Death from lead poisoning is often rapid and plainly marked by a distinct symptom complex when it occurs in industries using lead salts in large quantities, as for instance, in white lead factories and lead smelters. However we venture to say that lead, when used in smaller quantities for a long period of time, is more insidious in its harmful and baneful effect on the human body, than when the danger is evident as in the smelter and on the white lead stack. The number of individuals working under such conditions as does the painter and printer is greater than the few that work in the more dangerous industries. The respect which the worker holds for the hazard of his occupation is less when the toxic element is insidious and slow in its action.

It must be the purpose of this department not alone to protect those more dangerously exposed to lead, but also those, as we mentioned before, who are in large numbers working in small quantities of lead. Another purpose of this research was to observe clinically such men as suffered from mild lead intoxication so that the physicians of this department could obtain a clear understanding of the symptoms and physical signs of an early case of plumbism. It is important that the effect of lead be observed early, in order that the physician in any factory can advise removal from the dangerous process.

Previous work on this subject was performed by Dr. E. Hayhurst and published in the *Journal of the American Medical Sciences*, who made a critical examination of 100 painters. This department has simply endeavored to continue this work. Moreover, valuable information was obtained on this subject from Mr. John Runnberg, statistician for Local Union 194 and from Mr. Burton, instructor of the apprentice school conducted by the District Council of Painters of Chicago. The literature which was of especial value was the "Handbuch der Arbeiter-Krankheiten," by Theo. Weyl, "Die Berufskrankheiten der Maler, Anstreicher, und Lackieren," Fleck, and the British Factory Inspector's report.

The department had the kind cooperation of two painters' union locals, Mr. John Runnberg acted for Local 194 and Mr. Herman Jessen for Local 275, in sending men regularly to the Occupational Disease Department for the purpose of a complete physical examination. This work was begun on November 15, 1915. Further on will be observed tabulations of the results of these examinations. We wish to state that the men examined were not those sick, but rather those who were in good health and careful in their habits.

GENERAL DISCUSSION OF THE PAINTING TRADE.

It is estimated that there are in the State of Illinois 28,000 painters, including all branches. We quote at this point the following letter from

Mr. J. C. Skemp, National Secretary and Treasurer of the Painters' Union:

Enclosed is a classified list showing the membership of each local union of each branch of the trade.

The total membership of the Brotherhood in the State of Illinois is 13,317. The census returns will show the total number of men engaged in the different branches of the painting industry. Approximately I would say that, there are including factory painters of all descriptions, twice as many unorganized as organized painters.

This would make the estimate of Mr. J. C. Skemp even higher than 28,000, which is the estimate of the United States census. The majority use lead and the other toxic materials. Therefore a study of the general painter is sufficient to estimate the health hazard of from 28,000 to 35,000 workers in the State of Illinois.

By selecting Locals 194 and 275, we do not make a lead study on men who are engaged in lead painting in its worst form. The men from 194 are chiefly Scandinavian, those from 275 German. Home conditions and the general intelligence of the men in this craft, and the conditions under which they work, and the length of hours of employment per day are all productive of minimizing the dangers of their trade. There are many other painters who do not even work under such favorable conditions. Further on in this report will be shown a proof of the health interest, of one of these organizations, in a letter, warning painters, written by one of their own members.

CLASSIFICATION OF PAINTERS.

1. House painters.
2. Finishers.
3. Coach and wagon painters.
4. Japanners.
5. Sign painters.
6. Decorators.

In above list by far the greatest number are house painters, doing general work, chiefly indoors. Finishers are usually engaged in factories. A detailed description of each branch will forthwith be given.

House Painters.—Men in this trade will usually, upon being questioned, say that they work both inside and outside. In some of the labor organizations of this trade are included paper hanging, in others not. The majority of house painters are married men with families and are not inclined to wander from place to place to obtain work. This however occurs among a few and more frequently among unorganized painters. It will be observed in the tabulations that about 98 per cent began their trade when about 14 or 15 years of age. The majority of those examined learned their trade in the "old country." The education of the painter as regards his trade is more apt to be specialized in this country than in Europe, where the apprentice learn decorating, sign painting, finishing, enameling, interior and exterior work, the mixing of colors and even the chemical nature of the materials used.

The house painter works for painting contractors who usually provide a foreman from the organization. On most jobs the paints are mixed by one of the painter mechanics. The lead is bought in 300 pound kegs in the form of lead carbonate or white lead. This white lead is put into another keg and broken up with a paddle. Then, depend-

ing upon the requirements of the work, either oil or turpentine is mixed in this keg together with whatever color is desired. On most exterior jobs a glossy surface is required. This is obtained by the use of linseed oil. Most inside jobs require a flat finish. To produce this turpentine is used instead of much oil. Following the mixing of the paint the painting mechanic begins his work. The men doing interior work remove previous coats of paint with paint remover, with scrapping, burning, etc. The first coat on wall surfaces is usually an oil paint. Then another coat is put on after all defects in the wall have been "faced up." In the second coat the final color is approximated. A third coat is usually put on with turpentine paint in order to give it a flat finish. In the first coat the painter uses the brush with up and down sweeps of the wrist, but the third coat is put on and is also stipled. On interior woodwork the following procedure is gone through: The woodwork is filled with putty which fills in all nail holes and defects in the wood. Thereupon, a coat of shellac or varnish is put on. After this has been sand-papered, one or two more coats of varnish are applied. These are rubbed and polished with felt, or other woolen material. Enameled woodwork is filled in the same way, is covered with an oil paint, and with each coat additional, is built up with a paint, containing less and less oil and more turpentine. The woodwork is sand-papered between each coat. The final coat is absolutely flat. Lastly the enamel is applied.

Finishers.—Finishers are that class of painters that work on hard wood desks, bar room fixtures, pool and billiard tables, furniture, etc. First the wood is stained with an acid, aniline or oil stain (linseed oil or turpentine). This is wiped off with a rag, which leaves the pores of the wood filled with the stain. If it is open wood, such as oak, it must be filled with putty after which the thin first coat of stain is applied. This is applied lightly, simply for the purpose of preparing a smooth base or surface. Following this a coat of shellac is applied. Shellac contains gum of shellac and wood alcohol. Grain alcohol can also be used but is considered too expensive. Unfortunately the Federal and State laws are not prohibitive enough in the use of wood alcohol. This coat is then sand-papered down, not much dust being created, as in sand-papering heavier paints. Following this, varnish is applied. Varnishes contain generally oil, litharge, sometimes lead acetate and other ingredients. Oftentimes the content of varnish is largely turpentine. Usually one to three coats of varnish are applied, each being sand-papered, or rubbed down with pumice stone powder and water with felt. A substance known as "rotten stone" is sometimes applied for the purpose of rubbing. The final polish is then applied, containing usually oil and benzine. A French polish is sometimes used but not much in recent years. Creating a fine finish requires what the painters term, "building up with shellac." In French polish process much tedious rubbing is required, as is also considerable skill and for this reason most woodwork in this country is finished in the ordinary way.

There are 430 organized finishers in Chicago. The majority work for factories and various furniture concerns. The dangers of the work will be taken up later.

Coach and Wagon Painters.—With the growth of the automobile industry this class of work has increased. Not much lead is used in

coach and carriage painting as compared with house painting. Under this class we also include painters of metal machinery, such as harvesting machines, some of which are painted simply by dipping. The painting of automobiles is done by the application of a large number of coats of oil, oil paints, containing simply the colors with very little white lead. The colors are the chief vehicles of lead and oftentimes other mineral pigments are used. The hazardous phase of this work is the dust created by sand-papering.

Japanners.—Metal ware is japanned with a boiled down substance which will be described later. The chief requirement is that it dries quickly. Following the application of the japan the material is usually baked. There are various grades of japan classified according to color as, light japan and black japan.

Sign Painters.—Sign painters usually work outdoors, or if in buildings at one place only for a short time. The material contains lead, no sand-papering is done and this department does not consider the trade very detrimental to health.

Decorators.—The processes gone through in decorating and fresco work are often similar to the work of house painters. The work simply requires more skill and the hazard depends upon the location of the work and whether sand-papering is required.

Pottery and china painters are not included in this work because of its specialty and for lack of time in investigation.

TOOLS AND UTENSILS USED.

A brief listing of tools used are as follows: brushes, rulers, tape measures, paletts, color sieve, wood burning apparatus, scrapping knife, paddle, door lifters, screw drivers, puncheon, augur, hammers, and pliers. There should be required also respirators.

SCAFFOLDING AND ROPES USED.

Our law requires railings around all scaffolds, with safety guards on ropes and pulleys. In Germany step ladders are prohibited when above five meters. The most dangerous scaffolding is where a plank is put across two ladders. A great cause of accidents among the men is over reaching when on a scaffold.

DRY COLORS.

It is impossible in this discussion to accurately give a description of all dry colors used.

Red.—Most red paint, especially that used for painting barns and railroad cars contains iron pigment; other reds are composed of mercury sulphide, burnt yellow ocher, burnt sienna mixed with ocher, carmin from the South American shield louse, *Coccus Cacti*, lead chromate and aniline pigment.

White.—Composed of lead carbonate, calcium carbonate or chalk, calcium oxide or burnt chalk, zinc oxide. White lithopone is made out of 30 per cent zinc sulphide and 70 per cent barium sulphate, plus chalk and other vehicles.

Black.—Lamp black, mostly carbon, prepared with turpentine; graphite and antimony (not common).

Brown.—Produced by mixing red with other colors; burnt umber, raw umber, iron and manganese oxides.

Yellow.—Raw sienna, basic lead chromate, acid lead chromate, litharge. Aniline Gummi Gutti, iron oxide and hydrated iron oxide.

Blue.—Cobalt blue, Cobalt oxide with clay, iron cyanide, Fe_2O_3 .

Violet.—Aniline, hydrated iron oxide.

Orange.—Basic lead chromate, acid lead chromate.

Green.—Chrome oxide, chrome hydroxide, copper oxide, arsenic and aniline pigment.

VARNISHES.

Every varnish maker makes his varnish different, the better varnishes containing linseed oil, the cheaper varnishes Chinese wood oil and rosin. The consistency of the varnish depends on litharge, manganese oxide and lead oxide. It serves as a drier for the varnish in the oil which would otherwise not dry. Turpentine and benzine are used as vehicles to spread the varnish upon any surface. Some varnishes contain chiefly benzine, others turpentine. The object of a varnish is simply to resist the weather and mechanical force and not to penetrate the wood as paints do. It simply is a covering for wood or metal.

PAINT AND VARNISH REMOVERS.

Paint and varnish removers contain acetone, benzol, wood alcohol sometimes carbon tetrachloride, and phenol. Paraffin is used to stiffen paint remover. Most cases of sickness from paint remover are due to benzol and wood alcohol.

Japans—Japans are composed of gum, linseed oil and quick driers. They are thinned with turpentine and contain lead in the form of linoleate of lead. (The last preparation is made by boiling lead and linseed oil). Very little antimony is used in most japans.

ÆTIOLOGY OF SICKNESS AND ACCIDENTS AMONG PAINTERS.

In a careful investigation of the various branches of the painting industry, we consider that the health hazard is chiefly due to the use of lead and the manner in which the material is used; the element of dust; the use of other poisonous materials, such as wood alcohol, benzol, turpentine, oxalic acid, and various other chemicals used in smaller quantities; accidents; temperature changes; occupational strain due to rushing and season work; abnormal postures; and poor ventilation in new buildings and where a hot room is required, requiring closed windows; also in the use of the salamander, because of carbon monoxide gas.

USE OF LEAD.

It is not necessary here to go into detail as regards the toxicity of lead and lead salts. It is well established that the white lead, with which the painter works is toxic and that the dry colors and lead sulphate are also poisonous merely in a lesser degree. The first danger to be mentioned and the most important cause of plumbism is the sand-papering of surfaces coated with lead-containing material. The fine dust created in this process contains lead carbonate, which enters the nose and mouth of the workman, about 70 to 80 per cent being swallowed, the rest entering the respiratory tract. Besides sand-papering, the painter also creates

dust by scraping off old paint or by burning the material. The more recent use of paint removers of course removes part of this hazard but adds another toxic drug. In the lectures given by the Department of Factory Inspection the physicians show two pictures of men sand-papering, one shows a posture in which the man's face is underneath his hand inhaling dust thereby created. The other shows the correct method in which the worker sand-papers below the level of his nose.

The second danger in the use of lead is mixing the paints. A fine dust is created by dumping the dry colors, if used, into the mixer. Moreover, the painter mechanic too often mixes the material with his bare hand. The use of a glove removes part of this hazard, still there is a chance even in handling the glove to cover the surfaces of the hand with the paint. Many contractors will discharge a painter who uses gloves either in mixing or in his work. No doubt there are certain fine jobs requiring such skill that the use of a glove would be impracticable. In most work gloves could be and should be used, in order to protect the painter's hands. Every one knows that even the face is sometimes covered with paint which drops down while working on overhead surfaces.

Window putty does not contain lead, woodfilling putty often does. This adds to the lead content of the material used. In addition we desire again to mention that lead is also contained in varnishes, although the application of this material does not create a great lead hazard.

Dust.—Dust is created wherever the painter works, first in sand-papering; secondly because such rooms as are being painted are usually littered with dust; thirdly, because sweeping is often done in such rooms. The apprentices especially inhales the dust from sweeping.

In another part of this report is an article upon the dusty trades. The dangers of dusts are mentioned. In the dust created by painters, especially when working in old houses, the fine particles not alone contain lead but also infective material, such as the germs of tuberculosis, diphtheria, pneumonia and bacteria. The dust is also a mechanical irritant to the respiratory tract, causing such conditions as rhinitis, laryngitis, bronchitis, pneumonia, and tuberculosis. Most important however, is that the dust created by sand-papering, scratching off paint, or by sweeping is the vehicle of poisonous substances used such as lead, and sometimes arsenic and antimony. (See article on Occupational Tuberculosis.)

Other Poisonous Materials.—Arsenic is found in some green colors, such as the Germans call "Schweinfurter Gruen;" antimony is found in black colors; barium in lithopon; copper in the various green colors and in the bronzes; chrome in the yellow and orange pigments; gold in bronzes and gold leaf work; iron in the various red pigments. It is useless to go further into the chemical composition of these various materials, because the poisons are not cardinal.

However, besides the use of lead, turpentine, and wood alcohol must here be mentioned. Turpentine injures the kidney, causing a so-called "turpentine hematuria." One of the department physicians, upon inquiring from men polishing tables in a furniture factory found that several of them had at some time or other suffered from hematuria. Turpentine also is the cause of much of the dermatitis which we observe

among painters. Wood alcohol is used at times and little need be said here as to the dangers of its use in producing wood alcohol amblyopia.

Many "finishes" as the so-called "perfection finish" seem also to be detrimental to the health of those who work in this material. We have found any number of men who have complained after working with this material, of vertigo, spots before the eyes, weakness in the legs, trembling, nausea and malaise. The substances contained in these quick drying finishers are benzol, other coal tar derivatives, benzine and naphtha. The above mentioned vertigo is not only evidence of health injury but is also sometimes the cause of serious accidents, especially when the man becomes afflicted when working upon a scaffold or ladder.

Oxalic acid is used in cleaning, and bleaching surfaces. Its use however is only recent and we have not as yet sufficient data to base any conclusions as to its harmfulness. Some of the men, however, have complained of nausea, gastric disturbances, headaches, and vertigo after its use.

ACCIDENTS.

The statistics compiled by Mr. J. Runnberg, the statistician for one of the painters organizations, numbering about 1,800 men, shows that in the last six years there are consistently about 30 accidents per year. If there are 30 accidents per year for 1,800 painters, there are about 450 accidents, or perhaps less, if finishers and coach and wagon painters are excluded. Still, with a conservative estimate we think that there are about 300 accidents to painters in one year in the State of Illinois. This is rather a larger estimate than that of other government reports. It is peculiar that the occurrence of accidents, according to Mr. Runnberg, is greater in the slack seasons when less men are working than in the busy seasons when there are a greater number of men at work. This is explained by German authorities as being due to the fact that a man who feels worried about his job when business is slack is more apt to overdo himself and take unnecessary risks. The time of day also plays a role as regards the cause of accidents, many of them occurring before the noon hour and before closing time when the work is rushed. Seasons and climatic conditions are also factors in the cause of accidents.

There is too great a tendency to attribute alcoholism as a cause of industrial accidents. More important factors are rushing and pushing a man at his work, carelessness on the part of contractors, carelessness upon the part of men who, because of familiarity with their dangers become imbued with a contempt for them.

Other causes for accidents among painters are the use of poisonous materials with which they work, such as the above quoted vertigo from the use of benzol, turpentine, wood alcohol and lead. Observation of our statistics as regards the examination of painters will show that a large percentage of them are afflicted with attacks of spots before the eyes and vertigo, especially when stooping at their work.

This department applies the structural iron law to the painters who work on scaffolding. All scaffolds must be provided with a railing at the back and also on the sides. The use of a plank across two ladders has previously been mentioned in this report as being the cause of many accidents.

Painters are also subject to minor accidents to the fingers and hands from the use of ropes, scrapping knives and other sharp instruments. Small accidents to the fingers causing abrasions and cuts are often aggravated when the worker uses aniline oil in his material.

TEMPERATURE CHANGES.

There are many trades where changes in temperature are unavoidable or nearly so. The painter often works in new buildings which are damp from newly applied plaster. Often times he is forced to go from a warm to a cold room and from laborious work to the outside cold air in the winter season.

THE SALAMANDER.

This is a small charcoal stove or burner used in new buildings to dry the walls and for heating purposes. It is very productive of carbon monoxide. The physicians of the department have met several mildly acute cases of carbon monoxide poisoning among painters, plasterers and lathers from the use of the salamander.

OVERSTRAIN.

The excessive rushing which is demanded of painters, especially in the larger cities, predisposes them to various conditions, which in turn subjects them to more indirect illnesses. In any occupation where a tension is maintained, there is a tendency on the part of those overstrained, to suffer from neuresthenia, and premature hardening of the arteries. It seems, moreover, that in the painters who are inclined to rushing, there is a greater predisposition to plumbism, and especially neuritis and joint disturbances due to lead.

One of the causes for rushing is that the contractors are swamped with work at certain seasons, as for instance, around the first of May in Chicago. Naturally the contractor and foreman try to get the maximum out of any man. Rush jobs, in which, owing to unforeseen reasons, overtime work is necessary, creates the same conditions.

DISEASES OF PAINTERS.

The conclusions placed in this report upon the diseases of painters, is based entirely on the hundred critical examinations performed by Dr. E. R. Heyhurst in 1913, and on the critical examinations performed by the physicians of this department since December 15, 1915, numbering one hundred and fifty.

Following are some of the tabulations concerning the character of the men, their age, nationality, time at trade, where they began the trade, and habits:

TABLE 1—AGE OF PAINTERS.

	Per cent.			Per cent.	
From 20 to 25.....	14	9.3	From 51 to 60.....	21	14.0
From 26 to 30.....	23	15.3	From 61 to 70.....	6	4.0
From 31 to 40.....	53	35.3	Over 70.....	1	.7
From 41 to 50.....	43	28.6			

TABLE 2—KIND OF WORK.

General, interior and exterior, and paper-hanging.....	89	Calcimining	1
Chiefly exterior.....	1	Carriage and coach painter	1
Chiefly interior.....	52	Hardwood finisher.....	3

TABLE 3—NATIONALITIES.

American (born in U.S.)	35	Hebrew	11	Italian	2
German	35	Russian	7	French	2
Swedish	25	Danish	4	English	1
Norwegian	22	Austrian	4	Dutch	1

¹ Hungarian, 1; Austrian, 2; Polish, 1; the rest Russian Jews.² Includes 4 Finlanders.

TABLE 4—TIME AT TRADE.

From 5 to 10 years	11	From 31 to 40 years	22
From 11 to 20 years	66	From 41 to 50 years	6
From 21 to 30 years	41	Over 50 years	1

TABLE 5—LEARNT THE TRADE.

In the United States	69	In Russia	14	In Austria	6
In Sweden	14	In Denmark	4	In Italy	2
In Norway	14	In Holland	1	In France	2
In Germany	21				

TABLE 6—HABITS.

	None.	Occa- sional.	Mod.	Exces- sive.		None.	Occa- sional.	Mod.	Exces- sive.
Coffee	17	2	96	36	Smoking ¹	37	4	69	25
Beer ¹	21	22	79	14	Chewing	93	6	23	1
Whiskey ¹	48	36	44	8	Snuff			4	

(Above out of 133 painters).

¹ From above 15 quit alcohol altogether after using immoderately or occasionally.² Likewise 5 quit smoking.³ Four ate meat excessively, one was a vegetarian.

TABLE 7—CIVIL STATE.

Married or widowed	115	Bachelors (over 30)	21
Single (under 30)	9		

TABLE 8—FAMILY HISTORY.

Causes of death of father—		Causes of death of father—Concluded.		Causes of death of mother—Concluded.	
Unknown	57	Typhoid fever	3	Smallpox	
Old age	17	Smallpox	2	Meningitis	
Circulatory	13	Causes of death of mother—		Accident	1
Pneumonia	4	Unknown	52	Insanity	
Insanity	1	Old age	7	Brain Tumor	1
Cancer	4	Circulatory	11	Childbirth	4
Living	31	Pneumonia	3	Diabetes	1
Meningitis	1	Typhoid fever		Living	46
Accident	5			Cancer	4

¹ Includes sudden death, dropsy, and severe asthma.

TABLE 9—PREVIOUS ILLNESSES.

Pneumonia (Lobar)	12	Meningitis	1	Pericarditis	1
Typhoid fever	20	Smallpox	2	Tubercular epidymitis	1
Acute articular rheu- matism	20	Scarlet fever	11	Fistula in ano	1
Malaria	9	Erysipelas	2	Arsenical dermatitis	1
Yellow fever	1	Diphtheria	4	Sciatica	1
Cholera	1	Pleurisy	4	Gout	1

NOTE.—In four histories we find a statement in which syphilis was admitted.

PRESENT COMPLAINTS.

	Mild.	Mod- erate.	Severe.		Mild.	Mod- erate.	Severe.
Loss of weight	18	8	5	Digestive—			
Loss of strength	17	10	2	Nausea	13	3	
Nervousness	30	11	2	Vomiting	4	4	2
Malaise	5	5	2	Eruptions	4	4	1
Pulmonary—				Anorexia	19	8	5
Cough	23	16		Foul taste (mornings)	2	4	
Sputum	7	3		Salivary disturbances	12		
Hemoptysis	5	3		Constipation	24	39	10
Night sweats	9	6	1	Diarrhoea	5	1	
Pains in chest	32	14	3	Melenae	1		
Hoarseness		2		Hemorrhoids	6		2
Dyspnoea	6	9	5	Pain in abdomen	20	25	1

PRESENT COMPLAINTS—Concluded.

	Mild.	Mod- erate.	Severe.		Mild.	Mod- erate.	Severe.
Digestive—Concluded.				Neuro-muscular — Con- cluded.			
Distension.....	6	11	.....	Anesthesias.....	1	.....	.....
Bulimia.....	.....	.....	1	Paraesthesias.....	2	4	.....
Polydipsia.....	.....	.....	3	Lumbago.....	25	10	2
Sensorial—				Swollen feet.....	.....	2	1
Headache.....	19	20	6	Muscular cramps.....	9	4	.....
Vertigo.....	25	10	3	Trembling.....	3	1	.....
Syncope.....	2	.....	1	Fornication.....	1	.....	.....
Spots before the eyes.....	25	18	1	Loss of hands.....	1	9	.....
Tightness in chest.....	.....	2	2	Genito Urinary—			
Nightmare.....	2	.....	.....	Night urination.....	9	9	5
Insomnia.....	11	7	.....	Incontinence.....	1	1	.....
Rushing of blood to head.....	.....	1	.....	Impotence.....	1	7	3
Loss of memory.....	21	21	1	Hematuria.....	.....	1	.....
Depression.....	1	.....	.....	Stricture.....	1	.....	.....
Confusion.....	2	.....	1	Polyuria.....	.....	2	.....
Diminished vision.....	19	19	3	General—			
Diminished hearing..	5	5	1	Festering cuts.....	1	.....	.....
Neuro-muscular—				Itching eyes.....	17	7	1
Neuralgias.....	18	2	.....	Lacrymation.....	1	.....	1
Joint pains.....	22	28	9	Tinnitus.....	2	2	.....
Pain in right shoulder	17	15	11	Heart palpitation....	2	2	.....

HISTORY OF JOINT PAINS AND PAIN IN THE LIMBS (RHEUMATIC PAINS).

Out of the one hundred fifty painters, twenty-five (25) gave a history of having been troubled at some time or other with rheumatism. Twenty (20) gave a distance history of acute articular rheumatism. The most frequent location for joint pains was the right shoulder.

HISTORY OF COLIC OR ABDOMINAL PAIN.

Where the painter gave a positive statement of lead colic, at present or in the past, twenty-three (23).

Where the painter gave a history of abdominal pain at present or sometime in the past, eight (8).

Where the painter gave a history of abdominal cramps or colic at present or at sometime in the past, nine (9).

PHYSICAL FINDINGS.

Appearance unhealthy.....	19	Diminished hearing—	
Pallor.....	26	Right ear.....	9
Emaciation.....	14	Left ear.....	11
Adipose.....	13	Bifid uvula.....	1
Physical.....	8	Blue line on gums.....	5
Icteric.....	2	Foul breath.....	5
Prematurely aged.....	14	Cervical Adenopathy.....	12
Loss of expression.....	5	Thyroid enlargement marked.....	22
Nephritic appearance.....	4	Thorax—	
Scars on scalp.....	2	Pulmonary findings—	
Tortuous temporals (marked).....	5	Deformities of chest.....	4
Marked varicosities on face.....	6	Scoliosis.....	4
Edema of the lids.....	2	Abnormal dullness—	
Scleral hemorrhage.....	1	Right apex.....	24
Dilated pupils.....	3	Left apex.....	21
Conjunctivitis (mild except one).....	11	Right post.....	12
Strabismus.....	1	Left post.....	9
Unequal pupils.....	4	Roughened resp. in apices.....	15
Sluggish pupillary reflex.....	2	Abnormal bronchial breathing over all lungs.....	
Argyll Robertson.....	3	Rales right apex.....	22
Myopic (just by observation).....	8	Rales left apex.....	18
Corneal scar.....	1	Rales under axillae.....	21
Blepharospasm.....	1	Friction rubs.....	12
Exophthalmos.....	2	Cavities diagnosed.....	8
Good teeth.....	11		2
Loose teeth.....	32	Heart findings—	
Decayed teeth with tartar, etc.....	52	Hypertrophy left or right or both... Accentuated aortic 2nd.....	49 35
Pyorrhoæa.....	32	Mitral murmur systolic.....	7
Coated tongue.....	19	Mitral murmur presystolic.....	1
Tongue tremor—		Tricuspid systolic.....	3
Fine.....	56	Aortic diastolic.....	4
Coarse.....	40	Rough 1st mitral.....	1
Arcus senilis.....	10	Pleuro-pericardial rub.....	1
Laryngitis.....	29		
Bad tonsils.....	5		

PHYSICAL FINDINGS—Concluded.

Pulse—		Gouty toe joint.....	2
Tachycardia.....	10	Edema ankles.....	6
Bradycardia.....	2	Varicose veins.....	29
Irregular.....	2	Syphilitic ulcer. Leg.....	1
Cyanosis.....	7	Varicose ulcer.....	1
Marked evidence of arterio-sclerosis....	5	Epitrochlear glands.....	3
Abdomen—		Swollen right knee.....	2
Epigastric tenderness.....	7	Paralysis (peripheral neur) arm.....	1
Appendiceal tenderness.....	2	Sign of injury.....	1
Gall bladder tenderness.....	2	Flat foot marked.....	151
Liver enlargement.....	7	Clubbed nails marked.....	9
Right inguinal hernia.....	7	Tremor in hands.....	6
Left inguinal hernia.....	4	Patellar Reflexes—	
Bilat inguinal hernia.....	3	Unequal.....	5
Epigastric hernia.....	91	Exaggerated.....	26
Umbilical hernia.....	91	Absent.....	3
Femoral hernia.....	1	Sluggish.....	2
Operation scars.....	5	Loss of orientation.....	1
Varicocele.....	101	Loss of expression.....	5
Scars uncertain.....	111	Subnormal mentality.....	1
Urethral stricture.....	122	General spasticity.....	1
With active gonorrhoea.....	4	Urine—	
Phimosis.....	1	Albumin.....	9
Hydrocele.....	1	Sugar.....	4
Hypospadias.....	1	Casts.....	16
One testicle.....	131	Basophilic Deg Red Cells.....	1
General adenopathy.....	3	Haemoglobin Estimate—	
Skin—		100 per cent.....	22
Anasarca.....	3	90-99 per cent.....	84
Dryness.....	14	85-89 per cent.....	19
Dermatitis.....	145	80-84 per cent.....	29
Eczema.....	2	70-79 per cent.....	3
Acne.....	6		
Ichthiosis.....	1		
Dermographia.....	21		

¹ Extreme in 3. ² Marked. ³ Marked in two, suspicious in three. ⁴ One very marked TB gland. ⁵ One from injury, the others from faulty breathing and rickets. ⁶ Times. ⁷ 10 in both apices, 28 cases of active TB. ⁸ Dilated in 7. ⁹ In same individual. ¹⁰ Complained of, others not perhaps noted. ¹¹ Noticed from bubo. ¹² Noted because of complaint. ¹³ Removed because of TB epididymitis. ¹⁴ Chiefly hands, then legs. ¹⁵ Many not looked for.

SYSTOLIC BLOOD PRESSURE.

Systolic blood pressure, average—		Systolic Blood pressure, average—	
20 to 29 inclusive.....	132	50 to 59 inclusive.....	150
30 to 39 inclusive.....	132	60 to 69 inclusive.....	187.5
40 to 49 inclusive.....	143	70 and over.....	210

POSITIVE DIAGNOSES MADE.

Pulmonary tuberculosis.....	26	Exophthalmic goitre.....	1
Incipient or latent pulmonary tuberculosis.....	10	Chronic Nephritis.....	7
Chronic interstitial nephritis.....	15	Epithelioma.....	1
Heart leakage.....	9	Lead poisoning ¹	3
Diabetes.....	3	Tabes dorsalis.....	2

¹Lead intoxication diagnosed, on the basis of chronic constipation, fine tongue tremor and anemia; constipation 73, fine tongue tremor 56, anemia 51. This makes an estimate that from 51 to 73 out of 150 men show signs of plumbism in marked cases.

DISCUSSIONS OF SYMPTOMS.

Lack of time will not permit a detailed discourse on symptoms obtained. It is however noteworthy that 50 per cent of the painters are constipated; that about 25 per cent have some form of pain in the abdomen; that about 20 per cent of them are inclined to attacks of vertigo, and about 33 per cent have spots before the eyes, especially when they stoop at their work. We are inclined to attribute all of these symptoms to the constipating effect of lead, and also the spots before the eyes and vertigo partly to turpentine, wood alcohol, and lead directly. Lumbago and pains in the right shoulder are also symptoms especially common in painters. The lumbago as we all know, is due to some toxin in the body, and among the painters it probably is due to several factors, such as posture, constipation, and lead neuritis. The pain in the right shoulder we consider due to muscular fatigue and to lead neuritis.

Itching eyes, which is noticed only when the men are working in excess, is probably due to the irritating effect of turpentine and to dust.

DISCUSSION OF PHYSICAL FINDINGS.

The outstanding feature is the large percentage of lung lesions. In twenty-six cases there was a positive diagnosis of pulmonary tuberculosis; in ten a diagnosis of latent or incipient tuberculosis. Rales were heard eighteen times in the right apex, twenty-one times in the left apex, twelve under the axillae—these findings being duplicated in the same individuals making twenty-six cases of chests with rales in the apices and axillae.

Heart findings are also prominent. In the one hundred and fifty men examined we find a hypertrophied heart in forty-nine individuals, or about 33 per cent with a dilatation of seven of these. The aortic second sound of the heart is also accentuated in almost 25 per cent of the cases examined.

Upon first consideration of the blood pressure findings, one does not see anything unusual, but upon further thought, considering that about 20 per cent of the painters are suffering from tuberculosis, we must conclude that the blood pressure readings are high. The reading of hundred and forty for the life decade of 40 to 50, and the reading of one hundred and fifty for the life decade of 50 to 60, by some authorities, is considered normal. We again state, however, that owing to the presence of tuberculosis, this blood pressure finding might be considered rather high. Then comes the leap of 187 for the decade of 60 to 70, showing in a large measure the presence of arterial disease.

RESPIRATORY DISEASES.

Tuberculosis.—We have shown by our data and also from the death rate from tuberculosis among painters, that tuberculosis might almost be considered one of the occupational hazards of the painter. Following are the reasons for this:

- (1) Reducing the body vitality by lead intoxication.
- (2) Because painting may be considered a dusty trade.
- (3) From working in infected houses.
- (4) From overstrain, during season work.
- (5) Posture.

Rhinitis and Laryngitis.—The painter also complains of rhinitis and laryngitis, which is no doubt due to the dust aroused during his occupation.

CIRCULATORY.

Our statistics show the occurrence of circulatory disturbances in a large magnitude. Why should so many painters have hypertrophied hearts and other evidence of arterial disease? Considering the fact that the work is not inordinately physical, and since the craft is not crowded by alcoholics, we must attribute much of this to the effect of lead on the arteries. Mortality statistics will bear us up in pointing out that the death rate from nephritis, angina pectoris, myocarditis, and cerebral hemorrhage is high.

GASTRO-INTESTINAL.

Condition of the Teeth.—Out of 150 painters 52 had teeth markedly decayed and covered with tarter; among these there were 32 with severe pyorrhoea. Among these there were also 32 with loose teeth. No account was taken of those that had entirely lost their teeth and were wearing plates. In all our experience among the occupations we have never

seen any group of working men, with the exception of those who worked in acids, such decayed teeth and so many cases of pyorrhoea. This condition may also predispose the painter to circulatory diseases as well as to tuberculosis. We consider that the condition of the teeth is due to lead.

Gastric Disturbances.—We have mentioned before that twenty-three of the painters positively had lead colic at some time or other, and that



Figure 29. Correct method of sandpapering by keeping below breathing line.

17 were troubled either at present with occasional abdominal pains or cramps. Among these there were seven with distinct epigastric tenderness. Then must be mentioned again the large percentage that are continually constipated. We do not see this among any other group of workmen than those that work in lead. Without further discussion, we do not consider ourselves illogical in attributing these gastro intestinal disturbances to lead.

CONCLUSIONS.

The painting occupation is one with considerable health hazard. Following are the chief dangers:

- (1) Pulmonary tuberculosis.
- (2) The lead diseases; chronic interstitial nephritis, myocarditis, cerebral hemorrhage, chronic arthritis, and neuritis.



Figure 30. Incorrect method of sandpapering. Dust created by rubbing is in the same area as breathing line. If work is so high that painter is compelled to reach, he should stand on ladder.

FOLLOWING ARE LAWS AND REGULATIONS WHICH WE SUGGEST TO PROTECT
THE PAINTING TRADES.

1. That all dry sand-papering be abolished, and substituted by a wet process, which consists usually of pumice stone and water, with a

piece of felt or other piece of cloth. This method is slightly more expensive, but is compensated for by a better quality of work.

2. A law should be enacted which makes it compulsory for the employer to furnish gloves for the painter as a part of the necessary equipment. Furthermore, that soap, hot water, nail brushes, clean towels, toilet and washing facilities must also be furnished by the employing painter. (Now in force by the District Council of Painters, Chicago.)

SUGGESTIONS FOR REMEDYING HEALTH HAZARDS IN THE PAINTING TRADES.

To remedy the lead hazard in the painting trades, there are two choices offered:

- (1) To legislate entirely against the use of lead.
- (2) To legislate for paint containing only a small percentage of lead.
- (3) To legislate such protection as indorsed by State Officials, or by a separate hygienic investigation made by the painting trades.

It seems that the fair procedure is rather than radically legislate against lead, to request the last suggestion; namely, that through further investigation, especially conducted by the painting trades, such measures for health protection, be offered our future legislative bodies, so as to minimize the lead hazard and those diseases indirectly due to the use of lead. Moreover, such legislation should not only include the lead alone, but also all materials used which can be proven toxic, also such processes which can be shown to be detrimental to the health.

3. Furthermore, that all poisonous substances used by the trade, should be labeled as Poison.

"INDUSTRIAL ECZEMA."

By George L. Apfelbach, A. B., M. D.

The Medical Department reports 12 cases of skin disease, who applied at the Occupational Disease Dispensary for diagnosis and advice. Of this number, seven were distinctly such skin lesions as seemed to the department physicians due to occupation. We give here a record of these cases:

Case 1.—Cigarmaker, age 35, Russian Jew, worked in a shop where cheap cigars are made; referred to the department by the Jewish charities; complained that he could not follow his occupation because of sore fingers and hands, had worked at his trade since he immigrated to the United States, 3 years ago.

Examination revealed fissures and cracks on fingers and between fingers, hand especially near fingers reddened, and moist eczema between fingers.

Diagnosis—Eczema due to not drying hands when moistening tobacco leaves.

Case 2.—Young man who worked in the print shop of a large mail order concern complained to us of eczema. He had been troubled off and on since in the printing trade, 6 years. Had been treated with success, but lesions reappeared. Examination showed that fingers, hands and forearms were covered with an infected "weeping eczema."

The infection was cleaned up by applicant's family physician. The eczema gradually disappeared. Upon resuming work, the patient upon advice of the physicians kept his hands covered with oil (machine) and with vaseline while working on printing rollers or handling printers' ink. He reappeared in six months and stated that he had had no further trouble.

Case 3.—Printer, worked as a compositor in a small shop; complained of having been troubled for years with outbreaks of skin trouble on forearms, hands, face, and other parts of the body, noticed that skin condition improved when out of work.

Diagnosis.—Dermatitis of hands. Advised to seek work where new type was being used.

Case 4.—Painter, age 46, complained of burning, sore fingers, hands, and forearms. Admitted that condition was more severe after a busy season, and when working indoors (where turpentine is mostly used). Advised as to cause and also remedy for removing such. Patient has not yet returned, and no information therefore as to recovery.

Case 5.—Painter, age 27, at trade 13 years, is periodically affected with skin disease of the hands. Thinks it is due to his work. Attributes condition to lye soap used on job. Also does much flat work (turpentine). Skin on dorsum of hand and fingers reddened, thickened, fissured, with a small arch of moist papular eczema around the dorsal base of little finger on right hand.

Case 6.—Bartender, age 42, came to the physicians of the department because of sore hands. Had trouble for two months; previous attacks not so resistant to treatment.

Examination showed a moist eczematous condition of dorsum of hands, fingers, and interspaces of fingers. The physicians have seen conditions like this in other bartenders, and in "soda" clerks.

Case 7.—Printer; general hand in print shop; aged 19, cleans printers' rollers. Hands with papular eczema was even covered with printer's ink.

The department physicians regret that in the early days of their work on Occupational Disease, more accurate data was not kept on industrial dermatitis, eczemas and ulcerations, since a review of above cases brings to mind former cases mostly among painters and printers.

INDUSTRIAL SKIN DISEASES.

The purpose of this article is not to simply quote above skin diseases, but also to mention the various forms of pathological conditions of the skin and the methods of production, that, with this report, perhaps workers in this State might be able to protect themselves from further trouble.

The skin may be injured or become diseased in occupations in different ways, such as through the effect of heat, cold, mechanical irritation, chemicals, direct trauma, acids, and alkalies, metals, plants, and even animals.

If any certain occupation has a hazard for skin disease, some will become affected and others not. Besides the causative agency, there must usually be an idiosyncrasy or tendency for that person to suffer skin disease. Even among workers using turpentine, one will often hear that eczema or dermatitis existed even in childhood.

Skin changes in some industries are mild; as for instance, the sunburn of the farmer, the red face of the teamster, the heat dermatitis of the stoker and furnace men. In others, the result is serious, even sometimes fatal, as for instance, arsenic ulcers, chronic ulcers, and the anthrax pustule of the tanner and wool-sorter.

It is not possible in this report to go into detail with a consideration of the various lesions, pathology and theoretical questions of the different occupational skin diseases. We shall simply give an outline, showing where possible, the causes and means of preventing the trouble.

Turpentine Eczema.—Painters, printers, etc. Turpentine eczema will be observed among painters, especially those doing interior work,

printers from the ink, cartridge makers, wood finishers, varnishers, japanners, and battery makers.

The turpentine dissolves the normal oil of the skin secreted by the sebaceous glands, allowing abrasion to the epidermis. This causes foreign substances, such as dust particles and bacteria to enter and creates an inflammatory process in the cuticle.

By keeping the skin oiled with equal parts of lanolin, vaseline, and castor oil, the eczema can often be prevented and also cured.

In case 2 quoted above, recovery soon followed the use of vaseline (sometimes even an irritant) when working with rollers and type covered with printers' ink, which contains turpentine.

Photo Engravers, Photographers and Tanners.—Above trades suffer skin lesions from chromic acid, chromic salts, pyrogallie acid, other acids, water, and excessive washing with strong soaps. Chromic acid and its salts produces dermatitis, eczema, sometimes infected, causing blisters, pustules, and also ulcerations. The lesions most commonly occur on the fingers, and hands, sometimes on the face and the nasal septum.

We see mentioned in the British Factory Inspector's Report of 1914 that bichromate solutions do not enter the unbroken skin. They usually begin on the knuckles, or at the base of the nails. The material penetrates deeper into the skin, forming sluggish ulcers, or, "chrome holes," as the workers call them. These ulcerations are accompanied by considerable pain, are usually infected, and sometimes lead to phlegmons and more serious infections. Death may be said to be out of the question, but the ulcers certainly cause considerable loss of time and disability.

Ulcers are not so commonly seen among photo-engravers, as among tanners who use chrome in tanning the hides. The lesions among photo-engravers are usually eczemas and dermatites.

Photo-engravers and photographers use other irritative chemicals, such as pyrogallie acid, metal, potassium cyanide, mineral acids, alkalies, copper salts, silver nitrate, all of which may injure the skin, causing lesions.

Workers, knowing the danger, often cover abrasions with "new skin" or rubber finger cots. Smearing the arms and hands with fat or special ointments, such as three parts of petroleum and 1 part lanolin, also prevents the formation of ulcers. When ulcers have formed, they should be covered with a zinc oxide dressing with gutta percha applied tightly to the skin by means of collodion.

Photo-engravers suffering from papular eczema will find equal parts of calamine and boracic acid, an efficacious lotion.

Washwomen; Laundresses; Scrubwomen, Etc.—A severe type of eczema occurs among these workers, chronic in type, chiefly on the hands and forearms, on the dorsal surface. In a severe attack the hand is reddened, swollen, and even covered with blisters. In cases that have subsided, the skin is thickened, the cuticle broken, so that deep fissures can be seen. Eczema among this class of workers is chronic in type and difficult to treat. The causes of eczema here are (1) Putting hands in water; (2) washing soda; (3) and soap.

Cement Workers.—Plasterers, concrete workers, stonecutters. Men in these trades are often exposed to cold, damp weather which "chaps" the hands. The direct factor, however, of eczema among these men, is

the cutting action of silicon, chalk, and marble used. Thus we can account for the horny, thickened hands, often times dermatitis and eczemas, not only among above mentioned trades, but also among men working at metal polishing, on sand, stone, and emery wheels, etc.

Bakers Eczema.—Causes for eczema are not alone confined to certain workers in bakeries, but also to candy makers, workers in manufacture of syrups, preserved fruits, patent medicines. One of the physicians saw outside of the Occupational Disease Dispensary a severe case of dermatitis on the face and hands of a girl, aged 18, pouring syrup in a cough syrup concern. The causes for eczema and dermatitis among bakers have been given by Theo. Weyl as (1) putting the hands in the wet dough, (2) the irritation of sugar, (3) the high temperature of the oven.

We consider the effect of sugar containing materials frequent cause for skin diseases, and believe that the dermatitis among bartenders is not alone due to working at a wet bar, tapping beer, but also to the carbohydrates in the beer. The dermatitis is fortunately not common, occurs less in these trades than among silicon workers mentioned above.

Anilin Workers.—Severe dermatitis is frequently observed among those using anilin oil, or its derivatives, among dyers, rubber makers, dry color concerns, manufacturers of wall-paper, and printers ink. The dermatitis if the person is predisposed, begins early, and if severe, often is indicative that the person cannot engage in processes where anilin is used. The skin becomes violently reddened, swollen, with considerable tenderness. It is not alone confined to the hands, but also to other parts of the body.

Platers.—Platers are subject if working conditions are unfavorable and if the worker is predisposed or careless, to dermatitis. Most platers will attribute their trouble to the cyanide. Other solutions used are more likely to cause their skin diseases. These are copper solutions, nitric acid, sulphuric acid, nickel solutions and the excessive dipping in water itself.

Cigarmakers.—We record above the case of a cigarmaker with dermatitis. (Case 1.) Eczematous conditions will not be seen where the worker is clean. A dirty worker who sorts out the tobacco leaves, having watered and sorted the tobacco, will dry his hands on his dirty apron, which in many incidences has been worn for days. The apron contains tobacco, and besides, he is not careful in completely drying his hands. Nicotine solutions are very irritating, and therefore dermatitis will sometimes ensue unless the worker is careful enough to use a clean towel.

Time does not allow a discussion of other trades in mind. We hope if any reader's trade has not been mentioned, that is suffering from skin disease he may discover that we have mentioned one of the toxic agents in his or her trade or work.

Following are points to keep in mind concerning industrial skin diseases:

1. Among any group exposed to skin irritants, some will acquire a tolerance for the irritating agents, others will suffer.
2. Sometimes an irritating agent will continue for a long period of time before skin lesions appear.

3. In addition to the irritating agent there are always on the skin pathogenic bacteria, which may complicate with pus infection a simple dermatitis.

4. Most skin lesions due to occupation begin on the hands (arsenic on the scrotum). Trousers or underwear may however allow exposure, so that lesions are also found on the legs.

Following is a short list of occupations showing toxic agents, and also a chart listing some of the more toxic agents.

LIST OF OCCUPATIONS IN WHICH OCCUR SKIN DISEASES.

Painters.—From (1) turpentine, (2) chrome, (3) strong alkalai soaps, (4) anilin.

Printers.—From turpentine in the ink. Calouses on fingers of compositors and machine operators, from trauma.

Cartridge makers.—Turpentine, mercury sublimate.

Battery makers.—Acids, turpentine, chrome and other irritants.

Photo-engravers.—Bichromate, acids, alkalies, pyrogallic acid, metal, silver nitrate.

Etchers.—Dragon red, acids.

Tanners.—Chrome, lye, water, anthrax.

Washwomen, scrubwomen.—Soap, water, chlorates, etc.

Cement workers.—Mechanical irritation and weather.

Platers.—Copper solutions, acids, cyanide solution.

Buffers and Polishers.—Mechanical irritation, rubber goods, anilin.

Machinists.—Lubricating oils, mechanical irritation.

Bakers.—Sugar, water, and heat.

Bartenders.—Water, beer.

Solderers.—Acids.

Cigarmakers.—Wet tobacco.

Cabinet makers and finishers.—Turpentine, pyridin.

Florists.—Flowers.

Slaughter house workers and butchers.—(1) anthrax, (2) tuberculosis of the skin.

Wool-sorters and workers.—Anilin, anthrax, bichromate.

Physicians, nurses.—Bichloride and phenol.

X-Ray workers.—Ultra violet rays.

Agent.	Trades involved.	Action.	Lesion.	Prophylaxis.
Turpentine.	Painters, varnishers, finishers, printers, compositors, pressmen, apprentices, cleaning rollers, printers inks, cartridge makers, cabinet-makers.	Dissolves out normal oily secretions of the sebaceous glands.	Dry dermatitis—Less commonly popular moist eczemas.	Oil hands with lanolin and petroleum, or equal parts of castor oil and vaselin.
Chrome, bichromate, chrome salts.	Tanners, photo-engravers, photographers, battery makers, platers, paint manufacturing, dry color workers, painters, calico printers.	Must be fissures, destroys epidermis and eats into cuticle—chemical irritant.	Ulcers, eczema, dermatitis.	Watch all abrasions on hands, wear rubber gloves, new skin or finger cots, morning inspection before going to work. Treat with calamine lotion.

Agent.	Trades involved.	Action.	Lesion.	Prophylaxis.
Water.	Washwomen, scrubwomen, laundresses, housewives, bakers, etc.	Absence of normal oil on hands—must be predisposition.	Dermatitis, eczema.	Rubber gloves.
Petroleum, paraffin.	Machinists, oil workers, etc.	Irritating.	Boils and dermatitis.	Add coal tar antiseptics to the oils.
Arsenic.	Manufacturing insecticides, paints, taxidermists.	Corrosive.	Ulcers—Often on scrotum and hands.	Gloves.
Mechanical irritation.	Cement workers, stonecutters, plasterers, plaster paries, emery wheels, grinders, stone, zither players, shoemaker, buffers and polishers.	Callouses—Horny thickened skin, fissures, cracks, abrasions, dermatitis, eczema, infections.	Mechanical trauma to epidermis.	Machinery guards, petroleum on hands, gloves.
Acids—Nitric, cyanic, muriatic, sulphuric, acetic.	Photographers, platers, matchmakers, chemists, solderers, battery makers.	Dissolves oils on skin, and acts as a chemical irritant, and even burns the skin.	Dermatitis, ulcers, burns.	Hooding tanks.
Alkalies—Sodium, hydroxid, calcium, etc.	Paint makers, soap makers, photographers, platers, washwomen.	Irritates.	Dermatitis, eczema.	Care of fissures on skin.
Tobacco.	Cigarmakers (those washing leaves).	Irritates.	Dermatitis eczema (between fingers).	Does not occur when worker dries his hands on a clean towel.
Flowers.	Florists and growers.	Toxic irritation of certain plants on skin.	Dermatitis.	Gloves.
Irritating chemicals used as antiseptic—Bychloride of mercury, Phenol and lysol.	Physicians and surgeons, nurses, attendants.	Irritation.	Dermatitis.	Substitution of other antiseptics, such as alcohol.

OCCUPATION AS A FACTOR IN PULMONARY TUBERCULOSIS.

By George L. Apfelbach, A. B., M. D.

That pulmonary tuberculosis often occurs from certain occupations, as predisposing factors, is proven by the valuable statistics of Frederick Hoffman, by the trade statistics from Germany in which physicians appointed for the various occupations in that country have kept a record of the incidence of sickness and the causes of death for many years. In certain Prussian statistics there are figures dating as far back as the early half of the nineteenth century.

In this State there have never been undertaken any measures in preventive medicine directed especially towards the subject of tuberculosis, as an occupational hazard, with the exception of a few laws which this department is at present enforcing. These laws are the "Health, Safety and Comfort Law," the "Child Labor Law," the "Ten Hour Law for Women," and in a lesser degree, the "Occupational Disease Law." Above all, however, must be mentioned the "Blower Law," which has,

according to the statistics, given to this department by Mr. William Britten, President of the International Union of Platers, Buffers, and Polishers, reduced deaths from tuberculosis by 37 per cent. This is one of the strongest proofs that pulmonary tuberculosis is indirectly due to occupation.

There have been as yet no direct steps taken by the Legislature to enforce laws which will enable the Occupational Disease Department to regulate or to check up on the tuberculosis situation in the various industries. The physicians of this department, however, have at times by the solicitation of various social service organizations, inspected factories where plainly the conditions were such as to predispose to tuberculosis, and where also by medical examination several cases were found. One of these is a factory in Chicago, where burlap imported from India is cut and sewed. The work creates a dust which is composed of long, fine and light burlap fibers. There are two such factories in Chicago.

This department does not consider that pulmonary tuberculosis should be treated in the manner that other occupational hazards have been legislated against in this State, but that a law should be passed which will require physicians in reporting cases to the various municipal health boards to specify not alone the occupation, but the processes of work in which the victim of the white plague was engaged. This information should be accessible to the statistician and physicians of both the State Board of Health and the Occupational Disease Division of the Factory Inspection Department. Knowing that tuberculosis is partly due to working conditions, this department without further legislation enforces the provision for adequate ventilation, hoods in dusty processes, and the installation of exhaust systems.

The physicians of this department are surprised at the lack of information of various health preventive agencies in this country. With the exception of the work of Frederick Hoffman and Doctor J. W. Schereschewsky, Surgeon United States Public Health Service, the literature so far brought forth, is astoundingly lacking in accurate information.

We can hardly understand why the physicians for some of the large corporations, having cabinet filed data which shows the physical condition, and health, as well as the illness which has occurred to their employees, have not brought forth information other than vague discussions on tuberculosis.

The usual literature is very plagiaristic. What is wanted is not a repetition of the same old trite information, but data which is scientifically accurate.

There are great possibilities in this State for a compilation of accurate information. In Chicago we have for instance, the Chicago Tuberculosis Institute, which for the past few years has conducted dispensaries in all parts of the city, diagnosing and treating tuberculosis, chiefly among working people. This institution although it obtains the occupation of the patient, does not seem to bother itself about the details of the work, followed by the victim. Moreover, that information which has been obtained has never been given to the public.

The average person sleeps eight hours; the average working man is supposed to play eight hours; but we know that the average person works nine to ten hours. Granting that the worker spends only eight hours in

his vocation, this would mean that he is passing away one-third of his time at work. If there are hygienic factors such as home ventilation, food, habits in the prevention of tuberculosis why should not these be taken into consideration in his industrial life considering that the time, which he spends at it, is one-third of his life?

If the municipal tuberculosis dispensaries and sanitariums throughout the State would follow this suggestion, we would have valuable data as regards the occupational tuberculosis hazard, even in five years time. This holds true not only for the organizations for the prevention of tuberculosis, but also for the health departments which compile vital statistics. In signing a death certificate it should be made compulsory to detail the process of the occupation.

We do not wish to give the impression in this article that the physicians for the various large companies are not making an endeavor to control the tuberculosis situation. Corporations know well enough that it is good economy to minimize the number of days of disablement for employees. They also know that persons afflicted will work with a disease, but will not work steady. Moreover, not all corporations are entirely mercenary, but are even philanthropic in certain social service and health measures which have been instituted in their business. We admire the work for instance on tuberculosis of Dr. Harry Mock who not alone examines all new applicants for tuberculosis, but who also has made physical examinations on practically all the employees in Sears, Roebuck & Co. with an efficient staff of medical men. He is able to thoroughly cover about one-third of the employees in one year's time. However, data from this institution is not sufficient since it does not cover such dangerous processes as occur in other trades. The medical information derived from such large corporations would not alone benefit the workers in their respective organizations, but would also be of great service to the men and women working in smaller establishments.

INDUSTRIAL ETIOLOGICAL FACTORS OF PULMONARY TUBERCULOSIS.

Following is a list of these factors:

- (1) Dusts.
- (2) Hygienic shop conditions.
- (3) Ventilation.
- (4) Overstrain.
- (5) Light.
- (6) Posture.
- (7) Occupational toxins.

A. DUSTS.

Frederick Hoffman classifies the dusty trades similar to the manner of Dr. Collis, who in 1912 made a thorough study of the effects of dusts in producing diseases of the lungs. He read this paper at the Sixteenth International Congress of Medicine held in London in August. Following were some of his conclusions: (1) Inhalation of all forms of dust is accompanied by diminished power of chest expansion. (2) Diminished power of chest expansion so produced is accompanied by high blood pressure. (3) Animal dust, apart from the presence in them of pathogenic micro-organisms, when inhaled, produces less effects than do vegetable and mineral dusts. (4) Vegetable dusts, when inhaled, tend to

produce a type of affection best described as asthmatic. (5) Of mineral dusts those composed of calcium salts are least injurious. (6) Inhalation of mineral dusts, which do not contain free silica, tends to produce irritation of the upper air-passages and respiratory diseases other than pythisis. (7) Inhalation of mineral dusts which contain free silica is associated with an excess of phthisis; an excess which bears a direct relation to the amount of free silica present. (8) In general dusts appear to be more injurious as their chemical composition differs from that of the human body, or from the elements of which the body is normally composed.

Following is the classification of Frederick Hoffman as to the character of dust in various trades:

Group 1.—Exposure to metallic dust—

1. Grinders.
2. Polishers.
3. Tool and Instrument makers.
4. Jewelers.
5. Gold leaf manufacturers.
6. Brass workers.
7. Printers.
8. Compositors.
9. Pressmen.
10. Engravers.

Group 2.—Exposure to mineral dust—

11. Stone workers.
12. Marble workers.
13. Glass blowers.
14. Glass cutters.
15. Diamond cutters.
16. Potters.
17. Cement workers.
18. Plasterers.
19. Paper hangers.
20. Molders.
21. Core makers.
22. Lithographers.

Group 3.—Exposure to vegetable fiber dust—

23. Cotton ginning.
24. Cotton textile manufacturers.

Group 3—Concluded.

25. Spinners.
26. Weavers.
27. Hosiery and knitting mills.
28. Lace making.
29. Flax and linen manufacture.
30. Hemp and cordage manufacture.
31. Manufacture of jute and jute goods.
32. Paper manufacturers.
33. Cabinet makers.
34. Wood turners and carvers.

Group 4.—Exposure to animal and mixed fiber dust—

35. Furriers and taxidermists.
36. Hatters.
37. Silk manufacturers.
38. Woolen and worsted manufacture.
39. Carpet and rug manufacture.
40. Shoddy manufacture.
41. Rag industry.
42. Upholsterers and hair-mattress makers.

Above classification, and the conclusions of Dr. Collis, are very efficient guides to the study of industrial tuberculosis. We observe that the effect of dust is as follows: (1) It acts either upon the upper respiratory passages or upon the lungs. For instance, silicon dust seems to cut the bronchial tubes and lung aveoli, predisposing to tuberculosis; flour dust such as used by bakers more often effects the upper respiratory passages, causing rhinitis, laryngitis. (2) Dust acts upon the air passages by cutting, remaining adherent to the passages, by forming deposits in the lung tissue itself, and lastly by carrying pathogenic bacteria, including the tubercle bacillus. Hayhurst states that the law dictated by Collis, is not infallible when he states that as the chemical composition of dust differs from that of the human body, or from the elements of which the body is normally composed, so does the danger of tuberculosis increase. Hayhurst considers that there may be more tuberculosis because of carbon dusts, such as a coal miner is subjected to, since so many miners die of accident.

Following is a list of the deaths from pulmonary tuberculosis in various occupations, per 100,000 inhabitants compiled by the Chicago Tuberculosis Institute:

1. Marble and stonecutters.....	541	26. Janitors, sextons	251
2. Cigarmakers, tobacco workers	477	27. Hucksters, peddlers	251
3. Plasterers, whitewashers....	453	28. Bakers and confectioners....	250
4. Compositors, printers, pressmen	436	29. Iron and steel workers.....	236
5. Servants	430	30. Carpenters and joiners.....	231
6. Hat and cap makers.....	415	31. Engineers and firemen.....	230
7. Bookkeepers, clerks.....	398	32. Leather workers.....	227
8. Laborers (not agricultural) .	371	33. Tailors	218
9. Tinnners and tinware makers	365	34. Blacksmiths	213
10. Cabinet makers and upholsterers	359	35. Hotel and boarding-house keepers	210
11. Musicians and teachers of music	350	36. Textile operatives.....	208
12. Glassblowers and glassworkers	342	37. Machinists	96
13. Barbers and hairdressers...	335	38. Architects, artists.....	189
14. Sailors, pilots, fishermen....	333	39. Gardeners, florists, etc.....	187
15. Painters, glaziers, varnishers	319	40. Physicians and surgeons....	169
16. Leathermakers	311	41. Merchants and dealers.....	164
17. Apothecaries, pharmacists...	306	42. Engineers and surveyors....	145
18. Coopers	300	43. Teachers	144
19. Plumbers, gas and steamfitters	294	44. Lawyers	140
20. Masons	294	45. Policemen, watchmen, detectives	137
21. Butchers	288	46. Boot and shoe makers.....	136
22. Saloon and restaurant keepers, bartenders and liquor dealers	286	47. Soldiers, sailors	135
23. Liverymen and hostlers....	268	48. Collectors, auctioneers, agents	131
24. Teamsters, hackmen	261	49. Steam railroad employees...	130
25. Boatmen, canalmen	257	50. Clergymen	124
		51. Miners, quarrymen.....	121
		52. Farmers, planters, farm laborers	112
		53. Bankers, brokers, officials of companies	92

We desire to use this list especially in discussing dusts. It will be observed that those occupations in which dusts are markedly prevalent are those in which the mortality per 100,000 population ranges from 400 to 541. Among these it can be seen that marble and stone cutters are the highest. This bears out the knowledge that silicon dusts are the most harmful. The tuberculosis of cigarmakers is not entirely due to dust, but other factors, which will be mentioned later, predispose them to pthysis.

Among compositors and printers we also have an occupation in which much dust is created by the paper fiber and the type.

There is a great liability to error in these vital statistics, because in obtaining them, the last occupation of a deceased is usually given.

Moreover, in certain so called healthy occupations, there may be branches thereof in which certain small groups of individuals are especially predisposed to tuberculosis, because of dusts and direct infection. We see for instance that janitors and sextons are in the middle of the list where if careful observation is made, we discover from examined saloon porters, that pulmonary tuberculosis is common among this class of workers, because of the direct infection from cuspidors and from sweeping floors.

We take the liberty to suggest that the incidence of pulmonary tuberculosis is higher among textile workers, especially the garment workers. This statement is supported by the work of J. W. Schereschewsky. In this trade much dust is created. The dust is a fine vegetable dust which sticks to the deeper respiratory passages. This again bears out a former statement that accurate knowledge as to the effect of occupation on pulmonary tuberculosis must be obtained by careful investigation of the process and the length of time, and detail of the process in which the patient was engaged.

Metallic Dust.—All metallic dusts are predisposing to pulmonary tuberculosis. The hazard depends entirely so far as occupation goes, on the quantity of metallic dust aroused in the process. For this reason, the "Blower Law" was enacted in Illinois. Metal polishers and grinders, tool makers, and brass polishers, are especially exposed to large quantities of cutting metallic particles. The dust from this occupation is not alone harmful to the lungs, but also to the skin and the eyes.

Mineral Dusts.—Mineral dusts seem to be harmful when they contain elements foreign to the human body, as for instance the material used by cement workers, stone cutters, and glass blowers. Carbon being an element in the chemical structure of the human body, is not so harmful in the form of dust; we do not see a high incidence of tuberculosis among coal miners, whose lungs are very anthracotic. Silicon dust is the most predisposing one to tuberculosis, chiefly because of its cutting qualities and because of its fine structure.

Vegetable Fibre Dust.—Nearly all vegetable fibre dust is harmful; some forms causing diseases of the upper respiratory tracts, and other forms involving lung tissue. For instance, we find tuberculosis only moderately common among millers¹ and bakers, although they breathe large amounts of vegetable dusts. On the other hand, they are frequently troubled with diseases of the nasal passages, the eustachian tubes, the larynx, and the upper bronchial tubes. The textile industries furnish us with respiratory diseases, both of the upper and lower respiratory tracts.

We refer the reader to the annual report of the chief inspector of factories and workshops of Great Britain for a complete investigation on weaver's cough.

The vegetable dust does not cut, is amorphous in structure, and is injurious to the tissue, because the ciliary cells in the respiratory passages find its removal difficult. Thus the dust adheres to the tissue and excites a tuberculosis either by directly carrying the bacilli or by arousing latent lesions.

Animal and Mixed Fibre Dust.—This hazard occurs among furriers, paper making, rag industry, upholsterers and hair mattress makers. The action of the dust is similar to that of vegetable fibre dust with the exception that we consider it more likely to be a vehicle for tubercle bacilli.

B. HYGENIC SHOP CONDITIONS.

Theo. Weyl in his "Handbuch der Arbeiter-Krankheiten," explains the tuberculosis among printers partly because of shop conditions. He applies this explanation also to similar trades, stating that whenever a

¹ Modern flour mills are not very dusty.

workman sits quietly at his work, he is averse to the slightest draft of air, and therefore, usually keeps the window closed. Upon thought this statement is certainly true as, sitting quietly with even a small current of air makes one feel uncomfortable, during the winter months. This condition prevails among printers, jewelers, seamstresses, bookkeepers, cigarmakers, and other occupations which cannot here be mentioned. Hygienic shop conditions include ventilation, light, number of people in a room, position of the toilets, cleaning, and care of materials used. Under this heading we omit ventilation and light for further and more detailed discussion.

One of the important factors in shop conditions is the amount of space occupied by each employee. Where workers are crowded the ventilation is not only bad, unless especially provided against, but the workers are apt, almost by direct contact, to become infected with tuberculosis.

It is acknowledged that to decrease pulmonary tuberculosis in school children, isolation should be undertaken. This holds true also in the industrial world. Since this is not always possible, the next best step is to prevent the crowding of workers.

The physicians of this department in a conversation with the nurse of a large clothing manufacturer were informed that in one department there were frequent discoveries of tuberculosis cases. This has been going on for five or six years. Upon inspection of a room they found that the girls and men were huddled together at benches in close quarters, depending only upon the window space for ventilation. It is said that most cases of pulmonary tuberculosis are contracted in childhood, but the statistics of this establishment showed more cases of tuberculosis than among the people of other trades of the same nationality and of the same social condition. The habits of cleanliness seemed to be avoided in this shop; the employees did not use any cuspidors. Handkerchiefs were lying loose upon the tables.

In a certain bank one of the physicians noted that three bookkeepers at the same job contracted tuberculosis. A culture was not made of the ledger, but it looks rather suspicious that infection occurred in these three men from these books. This should also be kept in mind in correcting shop conditions. Material used by a tuberculous person may contain bacilli for a long period of time and its use may infect other individuals.

C. VENTILATION.

This subject seems to bring forth more controversy among hygienists than any other public health question. For some time it was held that air was detrimental because of its carbondioxide content. Recent experimentations, especially by Dr. Frederick Lee of Philadelphia, show that it is not only the carbondioxide in the air which is harmful, but also the humidity, heat and cold. It was shown in an experimental manner that persons fatigued far more rapidly in a hot room with a high relatively humidity, than in a cold room, and also more than in a room either cold or hot with a low humidity. It is moreover thought that the skin excretions of the body vitiates the air. These two factors in addition to carbondioxide are factors in ventilation. Therefore, in a well ventilated

room we should see that the air is properly changed, that the room be not crowded with workers, and lastly that a low humidity be obtained.

The ideal ventilating system does not depend upon window space for air, since small drafts are irritating especially to those in a sedentary occupation, as for instance printers and jewelers. There is apt to be difficulty in preventing employees from shutting windows in factories dependent only on window space for air. In the new factory buildings of Europe the air, introduced into the shop, is heated in the basement and thrown mechanically into the workroom.

Vitiated air is a predisposing factor to pulmonary tuberculosis, perhaps not so much so as a dust laden air. This is shown by a high percentage of tuberculosis among fishermen who are inclined in the winter months to sit by the fireside in a small illventilated abode. Tuberculosis is quite common among the fishermen of Nova Scotia, who in the winter months are huddled in illventilated huts.

D. OVERSTRAIN.

Pushing a worker for long hours, causing nervous tension, at a monotonous occupation, soon bring about a condition of fatigue. Fatigue cannot be discussed here scientifically (See Goldmark on Fatigue and Efficiency). Fatigue soon brings about mental and physical disturbances among which we can list the condition known as neurasthenia, especially common among stenographers, schoolteachers, telephone operators, department store clerks, laborers who work twelve hours a day, seven days per week, also psychoses, and gastric disturbances. The condition of fatigue also brings a condition of irritableness which causes unnecessary worries, domestic disturbances, etc. The person in such a condition often neglects himself, forms irregular habits, eats and sleeps irregularly, and in short puts himself into such a condition as to become an easy victim of tuberculosis.

E. LIGHT.

Little need be said on this subject, since its truth is so selfevident. We know positively that light is an enemy of the tubercle bacillus. Light is also a necessity to the human metabolism, having an effect on the efficiency of the red blood cell.

F. POSTURE.

Abnormal posture especially in young individuals, produces deformities of the chest, which likewise predisposes to tuberculosis. Occupations so effected are printers, tailors, machine operators, musicians, bookkeepers and clerks, etc. Often times however, the posture alone in any occupation is not the cause of round shouldered conditions, but such is due often times to lack of muscular development due to other hygienic factors.

G. OCCUPATIONAL TOXINS.

In previous reports from this department the physicians have noted that lead poisoning also predisposes the worker to tuberculosis in a similar manner that syphilis does. We find this also mentioned by Dr. James P. Brittain in the bulletin of the Chicago Tuberculosis Institute based upon his experience as Associate Medical Director of the International Harvester Co. That this should be true is logical, since persons suffering from industrial toxins are devitalized and subject to infection.

CONCLUSION.

Dr. E. Hayhurst in the February number, 1915, of the Ohio Health Bulletin shows the necessity for public health legislation on occupational tuberculosis. He takes for a standard the farmer in which the mortality from pulmonary tuberculosis is 6.6 per cent. Following is a list of the percentage of death of a few trades which he mentions:

	Per cent.		Per cent.
Quarrymen and miners	9.0	Stonecutters	29.0
Carpenters	10.0	Painters	19.0
Iron and steel workers.....	16.0	Brass workers	31.0
Domestics	16.0	Stenographers	39.0

Above figures, and the preceding material is sufficiently convincing that health measures should be undertaken from an industrial standpoint to prevent tuberculosis. It is not enough to protect the public in their homes and in public places; we should with equal endeavor bring the campaign against the white plague into the field of industrial diseases. Following are concluding suggestions:

(1) Study the occurrence of tuberculosis in various occupations by reporting cases occurring in factories, workshops, and mercantile establishments, also those occurring among artisans, mechanics, etc., by reporting the information to either the Occupational Disease Department, or to the State Board of Health. This furnishes statistical data, in order to institute prophylactic measures.

(2) We suggest that organizations for the prevention of tuberculosis and tuberculosis dispensaries, take greater pains when obtaining a history to ascertain in detail the nature of the workers occupation.

COMPLAINTS.

The public is becoming better informed that health conditions can often times be improved upon in certain occupations by reporting such to the Illinois Department of Factory Inspection. Some of the complaints were found to be groundless, others showed up new occupational diseases. The department's instructions to deputy inspectors are, that if any suspected occupational disease condition existed, the doctors be notified and an inspection be made. Thereby a new method was found to ferret out such industries which were not detected in the general survey made by the physicians in 1913 and 1914. In most cases the inspectors judged rightly concerning occupational hazards, included in the Occupational Disease Law.

Following is a description of a few of the complaints which were followed up:

(1) An anonymous complaint was made to this department that girls were becoming ill in a hat factory. Upon inspection these girls were found working over a kettle containing benzol and carbon tetrachloride. The symptoms complained of were nausea, vertigo, and headache. By removing these pots to a better ventilated part of the shop conditions were improved.

(2) Complaint was made that many girls were becoming sick in a burlap factory. Investigation proved that there existed several cases of tuberculosis, due to the fine fiber of the burlap and also to the nationality and home conditions of many of the employees. It was impossible to entirely remedy the situation at this place; dust guards were however placed in front of the more dust productive machines.

(3) Complaint was made that employees working in a concern where artificial palms and flowers were made, were becoming sick in a certain part of the occupation from arsenic laden fumes. Upon inspection it was found that these fumes did not contain arsenic, but owing to the fact that several of these employees worked in the basement on a damp floor with little ventilation, discomforture and sickness occurred. The one case examined showed pulmonary tuberculosis. Ventilation was installed and the conditions of the floor were ordered improved.

(4) Complaint was made by one of the labor unions that certain workers were becoming ill from certain tars made by one concern; this case is still under investigation.

(5) A special investigation was made of the manufacture of painted china, one concern printing the china known as the decalcomania process. In only the latter is the occupational hazard great. In some of the other establishments the material is not used in large enough quantities to do much damage—most important of these is the use of fluoric acid.

(6) Complaint was made that certain paints used in making dolls and other toys were extremely poisonous—upon inspection and special investigation it was found that these paints were harmful only because of turpentine contained and that the paints contained no lead.

(7) A complaint was filed in this department that certain men were afflicted with nausea and that they became short of breath and blue in color when working in the pressroom of a large magazine publishing concern. Investigation proved that these men became sick from the same anilin containing ink remover reported in a special bulletin of this department in 1913.

(8) Upon receipt of complaint investigation was made of certain bronzes used in gilding. These bronzes contained a small percentage of lead. The concern was put under the Occupational Disease Law.

INDUSTRIAL HERNIA.

It is not beyond the scope of the occupational disease physicians of this department to deal with the subject of traumatic hernia. The subject is one which always arouses much discussion among railroad surgeons, insurance surgeons, benefit societies, workman's compensation boards and other agencies. This is especially true in those states where compensation laws for accidents are in existence. The Illinois Industrial Board rules that compensation shall be paid to any person who proves that he suffered a hernia, even reduceable, at any occupation, subject to the compensation laws.

After careful investigation it seems that this is the fairest method of taking care of this condition. It allows all employers of labor to examine their men before engaging them in any work and is also fair to the employee, because it removes the doubt in favor of the employee as to the cause of the hernia. This allows protection both for employer and employee. There is no doubt that many have and will take advantage of a free hernia operation, having had the hernia before working for the last employer. This should not, however, argue against the ruling of the Illinois Industrial Board, because it has allowed any employer of labor the opportunity to examine all new employees in order not to get "stung" on this proposition.

The physicians of this department after a careful investigation and after surgical experience themselves, have formed the opinion that this problem cannot be determined by scientific facts such as the question of

predisposition or the possibility of causing a hernia by a trauma such as occurs in the usual hernia which is seen before the industrial board.

Traumatic hernia cannot be clearly defined because of the difference of opinion as to whether it can even be produced. At a recent railroad surgeons' convention a paper was read which clearly seemed to prove that traumatic hernia is rare and that most so-called "traumatic hernias" were simply the discovery by an employee of a hernia which preexisted. During the discussion following this paper one of the railway surgeons openly admitted that while riding a horse when a young man he had fallen, and immediately thereupon noticed that he had a hernia. Before forming an opinion as to a proper understanding of hernia, supposedly traumatic or industrial, let us go into the etiology of hernia.

CAUSES OF HERNIA.

1. Predisposing causes.

(1) A long mesentery.

(2) A defect in the closure of the funicular process.

This includes all congenital malformations or embryological abnormalities.

(3) Large inguinal canal.

(4) Undescended testicle and lipomata.

2. Direct causes.

(1) Increased abdominal pressure. Strain as produced by coughing, sneezing, etc., ascites, and abdominal tumor.

(2) Direct violence.

(3) Direct violence to other parts of the body, other than the location of the hernia.

DEFINITION OF HERNIA.

A hernia is the abnormal protrusion of any organs of the body through a parietal structure. The most common forms of hernia are the inguinal, umbilical, femoral, and ventral hernias. Other forms of hernia are, diaphragmatic hernia, Richter's, Littre's, epigastric, sciatic, brain hernia, etc. Those which come mostly before a compensation board are the inguinal, femoral and hernias of the abdominal wall.

ARGUMENT IN FAVOR OF PREDISPOSITION TO HERNIA.

It has been proven by a large number of hernia operations performed, that following are the constant findings. First, it has been noticed that fat tumors, namely, lipomata exist at or about the hernial sack, near the internal and the external rings of the inguinal canal. Secondly, a large number of hernias operated are positively congenital in structure, such as on open, unclosed funicular process or one only partly closed. Thirdly, work done by Treves shows that in persons afflicted with hernia there is a long mesentery and that in persons not so afflicted it would be impossible for an intestine to descend into the inguinal canal.

In operating so-called "traumatic hernias" it is surprising that such a recent accident does not show trauma to the sack and adjacent structures, and that a part of the parietal peritoneum could have become so enlarged in so short a time. There should also be at times evidence of such trauma as, ecchymosis and edema in the hernial structure.

The intestine, being very susceptible to shock, should in the production of a hernia be sufficiently affected as to produce shock with the accompanying symptoms of syncope, rapid pulse, nausea, vomiting, cold clammy skin, and palor.

Golebiewski, chief surgeon of the German Berufsgenossenschaft denies the existence of traumatic hernia. He states that to make a diagnosis of traumatic hernia it would be necessary to prove that there were signs of ecchymosis and signs of shock. If such members as come under the jurisdiction of this society prove shock or signs or ecchymosis, compensation is paid.

Experiments were performed on cats by Drs. Pember and Nuzum, who tried all manner of methods in producing trauma. The cats were rolled on the floor, thrown from different heights and subjected to various direct forces; hernia was never produced, but instead they found that there would more often occur a rupture of one of the viscera.

This viewpoint, which is that naturally held by the railway surgeons, and those representing insurance societies, would hold from the evidence given above that a traumatic hernia must necessarily be accompanied by such signs of injury as ecchymosis, edema, abrasion, and by signs of shock as mentioned previously in this article. If this method would be held there would be very little compensation paid for hernia. The weight of scientific proof is heavily in the balance of this viewpoint. Whether the signs of injury and the signs of shock must necessarily accompany the production of a traumatic hernia has however never been proven. This is another proposition in the argument.

ARGUMENT IN FAVOR OF COMPENSATION FOR HERNIA.

First, although there exists scientific proof that most hernias are due to congenital predisposing factors, there is the question of whether a hernia could have occurred under the strain of ordinary life upon the parts involved. The question is, did the man work under such conditions imposed by his occupation as to cause a hernia which would not have formed in the ordinary course of life?

Secondly, those who argue in favor of demanding signs of injury and signs of shock in order to diagnosis industrial hernia have never yet satisfactorily proven that a hernia with only a moderate predisposition cannot occur from trauma without such signs.

Thirdly, granting that there exists some doubt as to the possibility existing of the production of traumatic hernia, it is no more than right that the workingman should receive the benefit of the doubt, because of the power of the employer to protect himself, by not employing men with hernia.

CONCLUSION.

(1) Scientific proof is in favor of a predisposition to hernia, and considers most so called "traumatic hernia" preformed.

(2) If traumatic hernia occurs it has never yet been proven that such must necessarily occur with signs of ecchymosis and symptoms of shock.

(3) Any legislative body deciding as to whether hernia is compensable has the following alternatives:

(a) To pay all cases of hernia which the employee says he suffered during his work unless the employer can prove that hernia existed at the time when such employee was engaged.

(b) To pay for hernia only when the employee presents such evidence at the time of occurrence as shock and signs of injury.

EXPERIMENT ON LEAD CARBONATE.

By George L. Apfelbach, A. B., M. D.

INTRODUCTION.

This experiment was performed to show the relative toxicity of lead sulphate and lead carbonate.

Following were the conclusions of the experiment recorded in the bulletin of October, 1913.

1. Guinea pigs subjected to lead sulphate dust will in a short time exhibit a symptom complex approximating acute plumbism as seen in the human. (Death in an average time of twenty-one days.)

2. The similarity of symptoms and signs, the presence of basophilic granules in the red cells, the detection of lead in the tissues, and the similarity of pathological changes in the organs lead us to conclude that the guinea pigs died from "Acute Plumbism."

3. Cases of lead poisoning have been reported by Hamilton, among the lead workers of Joplin, Mo. We have demonstrated the toxicity of lead sulphate dust to guinea pigs, and conclude that it is toxic to the human working with lead sulphate.

4. We believe that any general or sweeping recommendation to the effect that lead sulphate be substituted for the other salts (purely on the grounds of its non-toxicity) to be premature and fallacious.

Having shown in this experiment, performed in 1913, that lead sulphate is toxic, an experiment was undertaken in the past year to ascertain the relative toxicity between lead sulphate and lead carbonate and also whether there were any other pathological changes in pigs dying from lead carbonate than there were in the pigs dying of lead sulphate.

METHOD OF CONDUCTING THE EXPERIMENT.

The same apparatus was used in this experiment as in that of 1913. Powdered lead carbonate was placed in the hopper of the mill in the chemical hood. The pigs were placed in the compartment four hours daily. Upon death of a pig, a post-mortem was made and the tissues examined chemically and microscopically. Previous to the undertaking the pigs were weighed and during the course of the experiment the pigs were weighed biweekly.

DATA OBTAINED.

Pig No. 1. Initial weight, 493 Gm., weight at death 401 Gm. First symptom noted on the second day, died on the ninth day. No basophiles. Hind leg paralysis, on the sixth day; death with one convulsion on the ninth day. Gross pathology; hemorrhagic liver, absence of adipose tissue, stained intestines, tubercles in the lungs. Microscopic pathology: hemorrhagic nephritis, minute hemorrhages into the liver, congested areas in the lung, and minute hemorrhages into the brain.

Pig No. 2. Initial weight, 360 Gm., weight at death 270 Gm. First symptom noted on the second day, died on the fourth day. No basophiles. Three convulsions noted. No paralysis noted. Gross pathology: Hemorrhagic liver, stained intestines, absence of adipose tissue, intestinal adhesions. Microscopic pathology: hemorrhagic nephritis, liver enlarged with reddened areas and a black periphery, bronchopneumonia.

Pig No. 3. Initial weight, 349 Gm., weight at death 288 Gm. First symptom noted on the seventh day, died on the seventh day. No examination made for basophiles. Died with one convulsion. Gross pathology: bronchopneumonia, hemorrhagic nephritis, brownish stained large intestine. Not much loss of adipose tissue. Microscopic pathology: Small hemorrhages into the cortex of the kidney, minute hemorrhages into the brain.

Pig No. 4. Initial weight, 499 Gm., weight at death 357 Gm. Basophiles suspicious. Died on the seventh day. Initial symptom on the fifth day marked paralysis of both pairs of legs for four or five hours before death, no convulsion noted. Gross pathology: Blood of a thinner consistency than usually observed, absence of adipose tissue, especially noted in peritoneal cavity, discoloration of the intestines, marked hemorrhage into the stomach, gross hemorrhage into the small intestine in three places, tubercles in the lung, areas of bronchopneumonia. Microscopic pathology; hemorrhagic nephritis, hemorrhages into the liver, hemorrhages into the intestines with peculiar black deposits. (Doubt as to the nature of these black deposits, whether artefact, or whether part of pathology.)

Pig No. 5. Initial weight, 247 Gm., weight at death 201 Gm. Initial symptom noticed on the second day, died on the third day. No basophiles. Convulsions and complete paralysis for three or four hours before death. The hair became markedly shaggy and also lost its luster, as early as the morning of the second day. Gross pathology: stained intestines, hemorrhages into the kidney and liver. No microscopic pathology.

Pig No. 6. Initial weight, 318 Gm., weight at death 287 Gm. Died on the ninth day, no convulsions noted, except the death convulsion. Gross pathology: loss of adipose tissue, staining of the intestines, hemorrhages into the kidney, liver, intestines, lungs. No microscopic made.

Pig No. 7. Initial weight, 327 Gm., weight at death 246 Gm. Died on the fifth day. Initial symptom noticed on the second day: paralysis of the hind leg from which the pig recovered up to four hours before death. Basophiles suspicious. Gross pathology: staining of the intestines, hemorrhage into the stomach, hemorrhage into the liver and kidney, absence of adipose tissue. Microscopic pathology: hemorrhagic nephritis, areas of hemorrhage into the brain substance, areas of hemorrhage in the liver.

Pig No. 8. Initial weight, 410 Gm., weight at death 372 Gm. Died on the eleventh day. First symptom noticed on the seventh day, another convulsion on the eighth day; died with convulsions. Blood markedly pale. Gross pathology: staining of the intestines, general absence of adipose tissue, hemorrhages into the kidney and liver. Microscopic pathology: hemorrhagic nephritis.

Pig No. 9. Initial weight, 332 Gm., weight at death 283 Gm. Died on the eighth day. Moderate paralysis in the hind legs from the seventh to the eighth days. Feces black on the second day. (This was also noticed in the excretions of the other pigs, but not so definitely as observed in this one.) Gross pathology: hemorrhages into the intestines, liver and kidneys. Microscopic pathology: hemorrhagic nephritis. Hemorrhage into the brain substance.

Pig No. 10. Initial weight, 384 Gm., weight at death 336 Gm. Initial symptom on the second day, death on the sixth day. Basophiles suspicious. Died with convulsions. No paralysis. Gross pathology: staining of the intestines, absence of adipose tissue, gross hemorrhages, into the intestines, liver and kidneys. Tubercles in the lung. Microscopic pathology: hemorrhagic nephritis.

Pig No. 11. Initial weight, 372 Gm., weight at death 338 Gm. First symptom noted on the second day, died on the fifth day. Paralysis for three or four hours before death. Died with a convulsion. Basophiles observed. Gross pathology: staining of the intestines, large liver, with blackish edge, hemorrhagic nephritis. Microscopic pathology: hemorrhagic nephritis, hyperaemia of the liver.

Pig No. 12. Initial weight, 347 Gm., weight at death 312 Gm. First symptom noted on the fourth day, died on the seventh day. Died with convulsions, no paralysis noted. Owing to the pig having been dead too long, no post-mortem was performed.

CLINICAL OBSERVATIONS MADE.

In experimental work on pigs using lead in any form, it will be noted that the following cardinal phenomena occur:

1. A loss of body weight.
2. Paralysis preceding death.
3. Convulsions.
4. Changes in skin and fur of the animal.
5. Discoloration of the feces.

1. A loss of body weight: By comparing the figures in the charts, it will be noted that the pigs in the lead sulphate experiment lost about 35 per cent of their body weight from the initial exposure to the time of death; in the lead carbonate experiment one can observe that the pigs lost 16 per cent, of their body weight from the time of their initial exposure to the time of death. Furthermore, the average length of life of a lead sulphate pig was 24.75 days; the average length of life of a pig exposed to lead carbonate under the conditions imposed by the method of experiment will average 6.16 days. One cannot help but conclude that lead carbonate is more toxic than lead sulphate, in the ratio of 6.16 to 24.75, or as one is to four. The interesting feature is the difference in the loss of body weight. We do not consider ourselves illogical in concluding that the action of lead carbonate is so rapid and so toxic that death occurs by the toxic action of the lead on the higher nerve centers more rapidly than the toxic action of the drug is allowed to exert itself on metabolic changes.

2. Paralysis preceding death: A small percentage of difference exists in the number of pigs having paralysis in the use of two toxic drugs, 53.3 per cent having suffered a paralysis with the use of lead car-

bonate, 50 per cent with the use of lead sulphate. The small difference in this percentage is not enough to warrant a conclusion, but is suggestive enough, especially considering clinical experience on humans, that the more toxic the dose of lead the more likely the occurrence of coma, convulsions and death, and that a paralysis occurs more often in less acute cases of lead poisoning.

3. In both experiments convulsions usually preceded death, with the exception of those pigs that seemed to become tympanitic. These died with an apparent intestinal obstruction.

4. The changes in skin and fur of the animal are characteristic. The fur becomes shaggy and loses its luster. This occurred in both experiments, but was more noticeable in the lead sulphate series.

5. Discoloration of the feces: In both experiments the feces became blackish and brownish in color.

PATHOLOGICAL OBSERVATIONS MADE.

The pathology from the two series of experiments was the same except for one observation and that was the absence of adipose tissue. This occurred in both but was more marked in the pigs that died of lead sulphate. It might, however, be added that hemorrhages into the intestines and the stomach was more common in the lead carbonate series than in the pigs that died of lead sulphate. The other microscopic changes were the same for both experiments, and are as follows: (1) general pallor of the viscera; (2) darkish discoloration of the large intestine, sometimes of the small; (3) hemorrhages into the liver; (4) hemorrhagic nephritis.

CONCLUSIONS.

1. Lead carbonate is about four times as toxic as lead sulphate to the guinea pig.

2. Death from convulsions without a previous muscular paralysis is more apt to occur where the drug is extremely toxic.

3. In guinea pigs lead carbonate is so much more toxic than lead sulphate so as to kill the pig before such metabolic changes as loss of weight and adipose tissue can occur.

LEAD CARBONATE ON PIGS (1916).

No. of pig.	Initial weight.	Weight at death.	Percent- age of body weight lost.	Date first symptom noted.	Results.	Blood.	Clinical symptoms.	Pathology.	
								Gross.	Microscopic.
1	498 Gm.	401 Gm.	18.7	2d day.	Died on 9th day.	None.	Hind leg paralysis on sixth day, convulsions on day of death.	Hemorrhagic liver—Absence of adipose tissue, stained intes- tines, tubercles in lungs.	Hemorrhagic nephritis— Minute hemorrhages into the liver, congested areas in the lung, and minute hemorrhages into the brain.
2	360 Gm.	270 Gm.	25.	2d day.	Died on 4th day.	None.	Three convulsions, no paralysis.	Hemorrhagic liver—Stained in- testines, absence of adipose tissue, intestinal adhesions.	Hemorrhagic nephritis— Liver enlarged with red- dened areas and a black periphery bronchopneu- monia.
3	349 Gm.	288 Gm.	17.7	7th day.	Died on 7th day.	.....	One convulsion on day of death.	Bronchopneumonia, hemorr- hagic nephritis—Brownish, stained, large intestine, not much loss of adipose tissue.	Small hemorrhages into the cortex of the kidney, min- ute hemorrhages into the brain.
4	499 Gm.	357 Gm.	28.6	5th day.	Died on 7th day.	Thinner con- sistency.	Initial symptom on the fifth day, marked paralysis of both pairs of legs, no convulsions noted for four or five hours before death.	Blood of thinner consistency than usually observed, ab- sence of adipose tissue, es- pecially noted in peritoneal cavity, discoloration of the intestines, marked hemorr- hage into the stomach, gross hemorrhage into the small in- testine in three places, tuber- cles in lung, areas of bron- chopneumonia.	Hemorrhagic nephritis— Hemorrhages into the liver, hemorrhages into the intestines with pecu- liar black deposits (whether artefact, or whether part of pathol- ogy).
5	247 Gm.	201 Gm.	18.6	2d day.	Died on 3d day.	None.	Convulsions and complete pa- ralysis for three or four hours before death, the hair became markedly shaggy, and also lost its luster as early as the morning of the third day.	Stained intestines—Hemor- rhages into the kidney and liver.	None.

LEAD CARBONATE ON PIGS (1916)—Concluded.

No. of pig.	Initial weight.	Weight at death.	Percentage of body weight lost.	Date first symptom noted.	Results.	Blood.	Clinical symptoms.	Pathology.	
								Gross.	Microscopic.
6	318 Gm.	287 Gm.	9.75	Not noted.	Died on 9th day.	.....	No convulsions noted except the death convulsion.	Loss of adipose tissue, staining of intestines, hemorrhages into the kidney, liver, intestines, lungs.	None.
7	327 Gm.	246 Gm.	24.8	2d day.	Died on 5th day.	Basophilic positive.	Paralysis of the hind leg, from which the pig recovered up to four hours before death.	Staining of intestines, hemorrhages into the stomach, hemorrhage into the liver and kidney, absence of adipose tissue.	Hemorrhagic nephritis—Areas of hemorrhage into the brain substance, areas of hemorrhage in the liver.
8	410 Gm.	372 Gm.	9.27	7th day.	Died on 11th day.	Blood markedly pale.	Convulsion on eighth day, dies with convulsions.	Staining of the intestines, general absence of the adipose tissue, hemorrhages into the kidney and liver.	Hemorrhagic nephritis.
9	332 Gm.	283 Gm.	10.55	7th day.	Died on 8th day.	.....	Moderate paralysis in the hind legs from the seventh to the eighth days, feces black already on the second day. (This was also noticed in the excretions of the other pigs, but not so definitely as observed in this one.)	Hemorrhages into the intestines, liver and kidneys.	Hemorrhagic nephritis—Hemorrhage into the brain substance.
10	384 Gm.	336 Gm.	12.5	2d day.	Died on 8th day.	Basophilic positive.	Died with convulsions, no paralysis.	Staining of intestines, absence of adipose tissue, gross hemorrhages into the intestines, liver and kidneys, tubercles in the lung.	Hemorrhagic nephritis.
11	372 Gm.	338 Gm.	9.14	2d day.	Died on 5th day.	Basophilic positive.	Paralysis for three or four hours before death, died with a convulsion.	Staining of intestines, large liver with blackish edge, hemorrhagic nephritis.	Hemorrhagic nephritis—Hyperaemia of the liver.
12	347 Gm.	312 Gm.	11.22	4th day.	Died on 7th day.	.....	Died with convulsions, no paralysis noted.	Owing to the pig having been dead too long, no post-mortem was performed.	

CHART—LEAD SULPHATE ON PIGS (1913).

No. of pig.	Initial weight.	Weight at death.	Percentage of body weight lost.	Date first symptom noted.	Result.	Blood.	Clinical symptoms.	Gross pathology.	Chemical.
A-1	387 Gm.	312 Gm.	19	3d day.	Died on 9th day.	No basophilic bodies.	Sluggish movements, loss of muscular power noted when taking snails, paralysis of hind legs on seventh day, convulsions on day of death.	Minute hemorrhages kidney and liver, congested areas in lungs, blood vessels of duodenum and injected nodular congestions in small intestines, large gut stained brown, general absence of adipose tissue noted.	Lead found in composition of lungs, liver, bone, muscle, brain and kidney.
A-2	491 Gm.	415 Gm.	16	5th day.	Died on 9th day.	Granular bodies in a few red corpuscles suggestive of basophilic bodies.	Sluggish movements fourth day, two convulsions.	Broncho-pneumonia—Liver pale, minute hemorrhages in cortex of kidney, dark discoloration of large intestine.	Lead not found.
A-3	339 Gm.	253 Gm.	26	10th day.	Died on 23th day.	Basophilic positive.	Paresis front and hind legs, complete paralysis before death, five convulsions lasting from one-half to two minutes.	General anemia of all viscera and absence of fat, liver shows localized fatty areas.	Lead isolated separately in kidney and liver.
A-4	502 Gm.	302 Gm.	40	22d day.	Died on 30th day.	Basophilic positive.	Lethargy marked, paresis hind legs, twenty-first day complete paralysis of legs, abdomen distended, one convulsion.	Areas of congestion in lungs—Pleural adhesions, heart muscles extremely pale, liver dark and congested, spleen enlarged, dark discoloration of large gut, dura thickened, cerebral vessels injected.	Lead isolated in bone, brain, liver.
A-5	412 Gm.	274 Gm.	33	2d day.	Died on 8th day.	Negative.	Sluggish movements, rapid respirations two days before death.	Broncho-pneumonia — Viscera pale, no adipose tissue, stomach distended, base of brain markedly injected.	Negative.
A-6	501 Gm.	354 Gm.	33	16th day.	Died on 32d day.	Basophilic granules positive.	Convulsions on sixteenth day, pig not exposed to dust for one week, gain in weight noted, change in color of feces, paresis hind legs twenty-ninth day, paralysis complete one day before death.	Blood watery consistency, decrease in coagulability, general anemia of all organs, marked lungs negative, large areas of fatty degeneration in liver, kidney congested, dura injected, large gut deeply discolored.	

CHART—LEAD SULPHATE ON PIGS (1913)—Concluded.

No. of pig.	Initial weight.	Weight at death.	Percent- age of body weight lost.	Date first symptom noted.	Result.	Blood.	Clinical symptoms.	Gross pathology.	Chemical.
A-7	310 Gm.	204 Gm.	33	3d day.	Died on 12th day.	Negative.	Repeated convulsions three days before death, died in convul- sions.	Lungs diffuse patches red hep- tization, tubercles in lungs and kidneys.	Not made.
A-8	437 Gm.	312 Gm.	28	14th day.	Died on 16th day.	Negative.	Paralysis of hind legs, distended abdomen, two convulsions.	Absence adipose tissue—Minute hemorrhages liver and kidneys.	Not made.
B-1	394 Gm.	362 Gm.	33	18th day.	Died on 30th day.	Negative.	Died in one convulsion.	Viscera pale, heart muscle pale and flabby, large and small in- testine stained dark brown.	Not made.
B-2	299 Gm.	217 Gm.	27	3d day.	Died on 6th day.	Basophilic granules found.	Two convulsions observed.	Pleural adhesions—Enlarged me- diastinal glands, heart pale and flabby, brain injected, large gut dark, no adipose tissue.	Liver trace of lead, bladder distended and urine showed trace of lead.
B-3	327 Gm.	230 Gm.	29.	15th day.	Died on 18th day.	Basophilic.	Marked apathy from fifth day, died without paralysis or con- vulsions.	Vessels of dura and brain in- jected, large bowel stained dark brown.	Not made.
B-4	463 Gm.	305 Gm.	30	25th day.	Living.	Basophilic granules found.	Sluggish movements.		
B-5	561 Gm.	488 Gm.	23	26th day.	Living.	Negative.	Apathetic, one convulsion twen- ty-sixth day.		
B-6	257 Gm.	192 Gm.	26	14th day.	Died on 22d day.	Basophilic positive.	Convulsions fourteenth day, pa- ralysis hind legs twenty-first day, died in a convulsion twen- ty-second day.	Brain and dura reddened and ves- sels injected, dark discolora- tions large intestine, general pallor of all viscera, absence of adipose tissue.	Lead in muscles and brain.
B-7	514 Gm.	305 Gm.	41	15th day.	Died on 29th day.	Negative.	Sluggish movements — Loss of muscular power marked on 15th day, paresis hind legs 24th day.	Hemorrhages liver and kidneys, large gut discolored.	Not made.

SULPHUR DIOXIDE.

By George L. Apfelbach, A. B., M. D.

This gas occurs in such industries where smelting is being done, and usually arises from the slag of molten ore, the sulphur being contained in the ore as iron sulphide, lead sulphide, etc. The gas also arises from the biproducts concerns, the manufacture of ammonium sulphate and in other chemical processes.

Pathology.—There does not seem to be any action of this gas either upon the tissue or upon the blood. It acts as a mechanical irritant upon the respiratory tract, causing hyperaemia and later chronic inflammation of the mucous membranes. No pathological explanation can be given explaining the nausea and emesis with which persons are often afflicted, especially if not accustomed to the presence of this gas.

Symptomatology.—This gas produces a peculiar nausea to persons not accustomed to these fumes. Other symptoms are sneezing, coughing, and continuous expectoration. English inspectors consider that workers exposed to this gas are predisposed to lobar pneumonia.

CHLORINE.

Chlorine gas is not commonly found except in chemical industries, in the manufacture of explosives, dynamite and gunpowder, in bleaching processes. We have very little to report upon any cases occurring in any factories in this State. The gas being so pungent, efficient measures are usually taken to remove immediately from the room the fumes by means of adequate exhausts.

Symptomology.—Being a mechanical irritant of the respiratory tract, this gas produces such respiratory conditions as coryza, laryngitis, bronchitis, and lobar pneumonia.

BENZINE, NAPHTHA AND PETROL.

Derivatives of benzol are commonly used by manufacturers of rubber, felt hats, straw hats, clothing, printing rollers, printing inks. A complaint came to the department of illness among girls in a room in a hat factory during the month of October. The medical inspector reported that the girls used rubber cement in large quantities in pasting straw hats. The rubber cement upon analysis showed no other poisonous material than naphtha and benzine. The symptoms complained of by the girls were vertigo, headaches and loss of appetite. The ventilation being bad in this room, the inspector ordered a change in the position of the cement pot so that the ventilation would enable the fumes to be carried away from the workers. Although this did not remedy the entire situation it has reduced a great part of the illness among these girls.

The Ohio Public Health Journal refers to frequent illness occurring in the rubber plants at Akron, Ohio, in which the poisoning is due to aniline oil. Dr. Alice Hamilton and Dr. Frick also have gone into detail on aniline poisoning, in the Journal of the American Medical Association. Aniline is also one of the derivatives of benzol or rather is a coaltar product, such as is also benzine, naphtha, etc. The symptomology from all these coaltar derivatives is very much the same. The important result seems to be that it acts as a hard depressant and also acts upon the haemoglobin of the blood. The vertigo of painters using benzol, the

headaches among the girls mentioned above together with their vertigo, are suggestive of the similar action of all these coaltar products.

Prevention.—It is often difficult to do that class of work which requires the use of benzine, naptha, etc., under a hood. It is up to the department to protect such employees by warnings, such as wall notices, of the dangerous character of such materials with which they work.

FUMES AND GASES.

By George L. Apfelbach, A. B., M. D.

CARBON MONOXIDE.

Although carbon monoxide is not classified as an occupational poison in the Occupational Disease Law, various cases have been brought to the attention of the Department of Factory Inspection because of experimental work performed in past years by one of our physicians. This physician for the department reports that in the past year he has continued from time to time experimental work in regard to the gases in garages and tailor shops. In last year's report will be seen in detail, the results of a series of experiments on the analysis of the exhaust of gasoline engines. Twelve cases of carbon monoxide poisoning, six terminating with death occurred in and about Chicago, one in Decatur, two in East St. Louis with one death, one in Rockford, and by hearsay, one from the southern part of the State, in Carbondale. Not all of these occurred in industrial work. Three of them, terminating in death, were due to carbon monoxide poisoning in private motor garages. Previous to the experimental work performed by above mentioned physician in this department, there seemed to be some obscurity as to the cause of death from the exhaust of gasoline engines, as noted in several editions of the "Chicago Tribune," which later on gave in detail the analysis as obtained from the Illinois Department of Factory Inspection. Owing to the increase in the use of the gasoline motor and owing to lack of information as regards the exhaust of gasoline engines, this department again wishes to warn the public of the dangers of allowing a gasoline engine to run idle in a closed garage. Unless such information be spread among the public, there will be an increasing number of deaths from this cause. Following is an outline giving the sources of carbon monoxide poisoning.

ACUTE CARBON MONOXIDE POISONING.

1. Blast furnaces; over bustle pipes, mantles, on the top of the old top filling style furnaces, from the stoves, back fire, from leakage of any part of the pipe system along the gas route, from cleaning out and repairing cold furnaces and pipes, from working in the neighborhood of chimneys about the furnace, from working around or about the gas washers and dryers.

2. From open hearth furnaces, from accidental leakage through the brick walls, or metal plates.

3. Producer gas. Producer gas furnaces are increasing in use. They are used chiefly for producing power and heat, are commonly found in foundries, machine shops, and other manufactories. "Gassing" from producer gas furnaces does not occur if the furnace is in the open, but usually from accumulation of the gas in ill-ventilated buildings, or from working over such a furnace, directly above the exhaust of gas.

4. Running a gasoline engine with the exhaust emptying itself into an enclosed space.
5. Operating a salamander in a new building with doors and windows closed.
6. In the engine or boiler room of steam ships.
7. When the gas forms upon the explosion of methane in mines, (usual gas content 1.7 CO.).
8. From locomotive engines passing through long tunnels. (See the analysis of a case investigated for the state of West Virginia by Mr. F. J. Bachelder, consulting engineer, Chicago.)
9. From the ovens of bakeries, brick kilns, laundries, enameling and japanning processes.
10. From the leakage of street mains, involving electrical conduit workers, and street repair and sewer men.
11. Among operators of chemical furnaces.
12. In chemical laboratories.
13. Zinc smelters. Other smelters.

CHRONIC CARBON MONOXIDE.

Chronic intoxication from this gas occurs in tailor shops from the use of the tailors goose, from working over gas flames, such as are used for heating small pots and kettles, i. e. can soldering machines, electrotyper's kettles, etc., for salamanders, in garages. A complete list of places where rooms are vitiated continually by small quantities of this gas cannot be enumerated in this classification.

SYMPTOMS OF ACUTE CARBON MONOXIDE POISONING.

Prodromal symptoms and signs: A feeling of weakness in the leg, gastric pains, nausea, throbbing in the temples, ringing in the ears, general headache, vertigo and spots before the eyes. Oftentimes the gas has no odor, sometimes there is warning from the odor of other gases of which carbon monoxide is only a part. Sometimes the gas is present in such large percentage of volume that no prodromae symptoms occur, but that the patient becomes immediately comatose.

Coma—The coma of carbon monoxide poisoning varies in its intensity. It is marked by a full bounding pulse, vasomotor dilatation, causing a flushed hyperaemic skin, sterterous respirations, sometimes convulsions and muscular twitchings, involuntaries, dilated pupils, the odor of gas upon the breath.

The length of the coma varies, a coma lasting over twenty-four hours usually results in death. The longer the coma, even though recovery, the greater the tendency to a complicating pneumonia.

CHERRY RED BLOOD.

The blood obtained by piercing the ear in a gas coma is not constantly of a cherry red color but when it does occur it is strongly suggestive.

RED BLOTCHES.

Are frequently seen distributed asymetrically over the body, on the face, thighs, thorax. Blotches seen after death on the back are easily confused with post-mortem lividity.

SPECTROSCOPIC EXAMINATION OF THE BLOOD.

This can be done on autopsy or during life. It is a positive diagnostic sign. It will not be observed on blood very long after the occurrence of "gassing" except there be such condition present of a preservative character, as reported by Dr. Haldane, England, where bodies were removed from the charred rooms of a mine accident months after the disaster. (See Fishbine, Journal of the American Medical Association.)

OTHER BLOOD TESTS.

It is impractical to give the technique of the various blood tests used, we here refer the reader to the work done by Haines, Fishbine and Haldane.

SEQUELLAE OF ACUTE CARBON MONOXIDE POISONING.

1. Pneumonia.
2. Psychoses.
3. Neurasthenia.
4. Paralysis.

SYMPTOMS OF CHRONIC MONOXIDE POISONING.

Persons exposed to continuous small amounts of carbon monoxide often acquire an immunity to the gas, as proven by the experiments of Drs. Karasek and Apfelbach in 1910, in which a compensatory polycythemia of about 8 to 9 million red cells were found in persons exposed to small amounts of gas about blast furnaces, and also by the experiments on guinea pigs and rabbits, 1912, Montreal by two Canadian physicians, which revealed a similar blood reaction upon exposure to a carbon monoxide gas. Regardless of these findings it seems that some individuals later suffer from anemia, headaches, and gastric disturbances. Such condition in any individual would likely predispose to other conditions such as tuberculosis, etc.

PREVENTIVE MEASURES.

Previous reports of the department have gone into detail showing how to prevent carbon monoxide poisoning. It is often difficult and, like the regulation of many other industrial poisons, depends on the cooperation of employee and employer.

OCCUPATIONAL ANTHRAX DISEASE.

By George L. Apfelbach, A. B., M. D.

An investigation was made on anthrax, following the death of a man working in a tannery along the north branch of the Chicago River. The man had suffered from a carbuncle for several days and then died of "septicaemia." The newspapers mentioned that it was a case of anthrax poisoning. The results of the coroner's investigation as to this being an anthrax case, has not been ascertained.

Several tanneries were therefore inspected and a letter seeking information upon anthrax in Illinois was written to the Chief State Veterinarian. A copy of his reply, as will be seen later, dispels the fact that there possibly might be in Illinois more anthrax cases than the reports of the coroner's office, or the health department of Chicago, show. In New

York 25 anthrax cases were reported in the past year, 1914-1915. Why there should be less anthrax infection in Illinois seems puzzling. It is, however, a fact that the hides used in Illinois tanneries are chiefly from western and southwestern cattle of this country, whereas more Asiatic hides are tanned in the state of New York. The process of tanning is conducted, first by picking out the hides, washing them, scraping and cutting off the hair and bits of meat. Most of this is done in large vats and on platforms where water runs in large quantities. Before the hair is scraped off the hides are soaked in lime, which is known as the sliming process. After the hair has been cut off the hides are placed in a chrome solution for about 48 hours. It was argued by the manufacturers that the liming and tanning processes would destroy all anthrax bacilli and their spores. Ravanel has shown that this is not the case, that the spores are resistant to these processes. After the hides have gone through the chrome they are dried, treated with tallow and gelatine in order to give them a finish, after which they are ready to cut.

In the report on anthrax by Jos. A. Lanahan, medical inspector of New York, the following is shown: "Anthrax among cattle has been not unusual in this state, and for many years certain foci of the disease have been recognized. In 1912-13 there were twenty-seven (27) cattle outbreaks in fifteen (15) counties with one hundred and sixteen (116) deaths; in 1913-14 there were thirty-five (35) outbreaks in sixteen (16) counties with eighty-three deaths, a total of sixty-two (62) outbreaks during two years in twenty-one (21) counties, with one hundred and eighty-nine (189) deaths; but ten (10) counties in the 1913 list responsible for twenty-two (22) outbreaks and eighty (80) deaths appear in the 1914 list with twenty-nine (29) outbreaks and sixty (60) deaths. In only four (4) of these counties has human anthrax appeared. I have not at hand the statistics for 1915." Furthermore on March 27, 1916, Dr. Graham Rogers of New York, director of the division of industrial hygiene, called a conference in which were represented the commissioner of health of New York, chemist of the department of health, and Dr. J. G. Wills, chief veterinarian the department of agriculture, as well as Drs. L. L. Roos and J. A. Lanahan, medical inspectors of the state industrial commission. It seemed from this conference that cooperation is necessary on all state departments dealing with cattle and with the health of the people. Dr. Youland, explained the difficulties of work on anthrax in a health department where other work was being carried on. The liabilities of animals to the disease and the difficulties of disinfection was discussed; a committee was organized representing all these various departments to study and to remedy the anthrax question in New York.

Anthrax poisoning is more common in England than in this country. There were reported in 1913, seventy (70) cases with seven (7) deaths. This number is higher than any previous year because of the increase in the importation of hides. Most of the cases in England occurred on those working in wool, secondly on hides and skins and a few on those working in horse hair. Most of the hides used in England are from East India, Algeria, Thibet, from the Argentine, from Prussia and from China. Anthrax therefore occurs in hides coming from Asia, South America and Asiatic Russia. Following is a brief mention of

several of the processes in which anthrax occurred: First, cases of anthrax occurring from the woolen trades were frequent among those employees engaged in wool washing, willeying, card-feeding, wool sorters, combers and wool spinning. Secondly, anthrax occurred in industries using hides and skins among those that handle skins most frequently, such as sorters, unhairing hides and among the pit handlers of the hides.

Out of 993 samples of wool tested in England, anthrax spores were found in 111.

This has not yet decided the anthrax question in Illinois. The following facts are here set forth up to the present time:

First—The State Veterinarian, who has had twenty-five years experience in this State with cattle, may be quoted as follows:

Mr. Oscar F. Nelson, Chief Department of Factory Inspection, Chicago, Ill.

DEAR SIR: In reply to your inquiry of the 28th instant:

I beg to advise that anthrax among cattle is not prevalent throughout the State of Illinois. In some sections of the State we occasionally have an outbreak, but the danger of infection to laborers in tanneries through handling hides is negligible, principally for the reason that it is not permissible under the law to remove the hides from the carcasses of cattle dying from anthrax. There is practically no danger of cattle reaching the Chicago market or any public market when affected with anthrax for the reason that affected animals usually succumb within a short period after becoming infected.

During a period of the past twenty-five years I know of no instance where cattle were found to be affected after arrival at public market. The greatest danger to employees of tanneries would be through the receipt of hides from certain sections of the country, particularly southern states where the disease prevails to a considerable extent and where it is a common practice to remove the hides from carcasses of cattle dying from anthrax.

Very truly yours,

O. E. DYSON, *State Veterinarian.*

Second—The Chicago Department of Health has not had a case of anthrax reported for the last ten years.

Third—The coroner's office has no knowledge of the existence of anthrax.

Fourth—The physicians of this department covered those neighborhoods bordering upon the tanneries where most of the employees live, and by questioning physicians, especially the county physician of that district, no knowledge of anthrax or of conditions resembling anthrax were common among the people of these communities. Nevertheless, it is highly important that further steps be taken in which the various departments connected with State regulation of cattle and the various health departments, with the occupational disease department of the Factory Inspection Department, be on the lookout for anthrax disease. The reason for this is, that this department can not yet comprehend, in spite of its investigations, why anthrax disease should be more common in New York than in Illinois, and moreover why there has not even been one case in Illinois for the last five years. This department has informed the Chicago Department of Health to be especially on the lookout for cases of "septicaemia," arising from boils and carbuncles. Should any such deaths be reported the Chicago Health Department has kindly informed this department that such cases would be referred to the Factory Inspection Department for investigation.

LECTURES ON INDUSTRIAL HYGIENE.

On and about the same time that the Occupational Disease Dispensary was organized, a lecture consisting of 65 lantern slides was offered to the public on occupational hygiene. This was offered in the same manner that the occupational disease clinic was made public. The lecture is given by Dr. George L. Apfelbach, the slides being shown by deputy inspector Richard Carroll. The slides embrace the various industries affected by the Occupational Disease Act and show proper and improper methods of hygiene in other occupations that do not come under the law. Some of these slides are black and white, others lumiere or colored photography. Lectures have so far been arranged for or given to the Illinois Manufacturers' Association, the Chicago Turngemeinde, Sociale Turngemeinde, the Visiting Nurses' Association, the Painters' Unions L. U. 194 and 275, the Photo-engravers' Union, the Northwestern Medical School, the Loyola Medical School, the Printers' Union, and several of the women's civic organizations in the various wards of Chicago. So far the lectures have been well received and we believe their educational feature is of great value to the State.

METHYL ALCOHOL (WOOD ALCOHOL).

By George L. Apfelbach, A. B., M. D.

The wide spread employment of wood alcohol, particularly in varnish of the cheaper grades, has given rise to many cases of poisoning, probably a considerable percentage of which have not been diagnosed. As pointed out previously, there is an urgent need of more education, not only among journeymen painters, but among the laity in general, as to the highly poisonous nature of wood alcohol and great danger to the individual using it in any confined space. When it is remembered that a large percentage of varnishing is carried on in an atmosphere by necessity devoid of ventilation, either natural or artificial, the importance of greatly restricting its use and forbidding it entirely in any confined space, may be appreciated.

Of particular interest are the cases occurring in New York City among the employees of a large brewery. The brewery vats were varnished on the inside with a varnish in which wood alcohol was used as a solvent—three men died in this brewery in the course of varnishing the vats—the first case being diagnosed by the physician as epilepsy. Besides making this grade of varnish much cheaper, the wood alcohol acts as a very rapid dryer—these two factors in themselves are features which make for a wide spread use of this type of varnish. We have in the past year personally examined five cases of methyl alcohol poisoning, all of which occurred in cabinetmakers and finishers, painters.

Case No. 2 will be cited somewhat in detail as it is felt that it is a fairly typical clinical picture, and demonstrates as well that the individual need not of necessity be employed in an unventilated room to be subjected to this hazard. In all probability, the great majority of these cases escape the diagnosis of the physician.

Case No. 2. Painter by trade, 50 years of age, married, 3 children, venereal history negative, about fifteen years ago was confined to house

two weeks with a lead colic, has worked steady for the past five years, both inside and outside work on various jobs, also as sign painter, one week ago was engaged in applying a coat of varnish to the interior of the cabin of a small motor boat, and while the space was confined, there were six small port holes, all of which were open. This work occupied him but one hour, after which he returned to his home feeling as well as usual. Upon sitting down to his dinner, and this but four hours after exposure, he noticed a marked dizziness and severe pain about the eyes on coming into the lighted room; this was followed by nausea and no food was taken. The pain in the eyes becoming more severe, a neighboring physician was called who gave a purgative and prescribed some sedative. He was brought by a fellow painter to the department the following afternoon; following were the physical findings: Heart, lungs, and kidneys negative, marked photophobia, pupils dilated, catarrhal conjunctivitis, blood vessels being markedly injected. Subjectively, complains of shooting pains in forehead, nausea, and persistent dizziness which was worse during the night. A further examination of the eye grounds showed distinct engorgement of the retinal vessels. An examination of the varnish revealed a considerable proportion of methyl (wood) alcohol. The history and symptoms subjective and objective are fairly typical in this case. An experiment was undertaken with guinea pigs to determine the toxicity of the commercial methyl alcohol. Six guinea pigs were placed in a chemical hood, and exposed for a period of four hours daily to an atmosphere supersaturated with the fumes of methyl alcohol. This is intended only in the nature of a preliminary report, and we may say that five of the six pigs succumbed within a period of ten days, all manifesting convulsions after the second exposure. Microscopically the animals showed diffuse hemorrhages in the cerebral cortex and throughout the cord, particularly in the lower segments.

We should have at once a campaign of the widest publicity on the dangers of methyl alcohol, as its use is common, not only in varnishes and cleansers, but in chafing dishes. Restrictions should be placed not only upon its sale, but a label should be required, stating its poisonous nature.

DISEASES OF THOSE EMPLOYED IN COLD DAMP PLACES.

By George L. Apfelbach, A. B., M. D.

Among the applicants for medical examination were several persons afflicted with acute articular rheumatism. Most of these were in occupations which required them to stand in water or to work in refrigerators. Not all persons having acute articular rheumatism, work in damp, cold places, since rheumatic fever is an infection, which is partly dependent on the virulence of the organism and the resistance of the individual. Nevertheless, since this department studies occupational health hazards, this finding might have some significance.

One of these examined worked as tinsmith where the nature of the work required running water: two others were employed in the meat cutting rooms at the stock yards. Not only in these three cases, but among others especially former employees in refrigerating rooms in the stock yards did our physician observe cases of acute articular rheu-

matism and acute nephritis. Other observations showed that most refrigerator workers, and butchers suffer from considerable vasomotor disturbance. Butchers often attribute their adipose, plethoric, red faced condition to the skin absorption of fat. They usually deny eating meat excessively.

That a damp, cold temperature acts upon the vasomotor system is a physiological fact. Clinicians in Vienna speak of a "nephritis refrigerans." The writer has seen three cases of gangrene of the leg, syphilitic in origin, but predisposed by standing in ditches filled with water while digging.

Theo. Weyl, "Handbuch der Arbeiterkrankheiten" in an article by Leiser quotes the following table of sickness among male butchers, (not refrigerator men as in our stockyards) from 1903-1905:

	Number of members sick.	Percentage of sickness.	Percentage of members.
Accidents, bruises, burns	821	38.6	19.5
Venerial diseases	410	19.2	9.8
Respiratory diseases	153	7.2	3.6
Rheumatism	116	5.4	2.7
Skin diseases	102	4.7	2.4
Gastro-intestinal	98	4.6	2.3
Acute infections	85	4.0	2.0
Flat foot and foot affections	79	3.7	1.9
Nervous diseases	41	1.9	0.9
Heart disease	35	1.6	0.8
Eye and ear	32	1.5	0.7
Bladder and kidneys	12	0.5	0.2
Miscellaneous	141	6.6	3.3

Acute articular rheumatism from these tables shows a morbidity of 2.7 per cent of all members, 5.4 per cent of all sickness. This is high, and exists even so among workers not exposed to such unfavorable conditions as the refrigerator worker.

Nephritis, considering that most of these workers are robust, healthy young men, is also high.

This article is not written for the purpose of proving a condition, but for the purpose of suggesting new lines of observation in vocational diseases.

MANUFACTURE OF TINWARE AND TIN CANS.

By George L. Apfelbach, A. B., M. D.

There is much to be said concerning the health hazards of this industry. A brief description of the process of manufacture is necessary before a clear understanding can be obtained as to sickness among workers in the can manufactories.

PROCESS OF MANUFACTURE.

Cans are made from tin and composition sheet-metal, being rolled into any desired size and shape. In about six establishments the can is riveted together by a punch press; in seven other concerns the cans are soldered by machines, although some cans require hand soldering.

We have observed two types of soldering machines—one being a rotary drum on which the cans are soldered on the top of the machine,

the other being a chain carrier on a horizontal plane. The latter is more dangerous to health, because the soldering process is below the respiratory plane of the worker at the machine, and because it also is more liable to fill the room with fumes. Four can manufacturing concerns are making monthly medical reports as required by the Occupational Disease Law. Some of these use the horizontal type of soldering machines, others the rotary drum type. Three others have been ordered to comply.

In the horizontal type of soldering machines, the tin can having been properly shaped, runs on a conveyor into the soldering machine. It is necessary to solder the cans lengthwise and at the ends. The trough contains molten lead which is applied automatically to the can at a definite point. The machine also contains the flux, composed of hydrochloric acid, water salammoniac, rosin and zinc. This is applied at the point to be soldered before soldering. A gas flame keeps the lead in the kettles and in the trough in a molten state. During the process of soldering fumes containing rosin, steam, lead oxide, carbon monoxid gas arise.

From the soldering process the machine is conveyed to the testing tank, which is operated usually by a female employee.

Other processes of manufacture are hand soldering, labeling cans, printing and lithographing, packing cans, repairing machinery, etc.

CHARACTER OF EMPLOYEE.

During an inspection made in 1912, we found 400 men and 200 women and girls employed; during 1915 we observed 300 men and 75 girls in the same concern, while in another concern 300 males and 160 females were noted in 1912, and 240 men and 80 females in 1915. It seems that more males are employed at present than females, which is rather fortunate considering the health hazards of this industry. Upon questioning female employees we found, among 50 picked at random, that 37 were Polish born or of Polish parents, 6 Lithuanians, 7 Germans, 3 Irish, and 2 Austrians, all being of foreign parents. This does not hold true, however, of down-state can manufactories. The inspector was informed by visiting nurses in the neighborhood of canneries, that families from which the employees came were often ill-nourished, placed in crowded, illventilated dwellings with a high incidence of sickness such as pulmonary tuberculosis, acute infections, etc. Many of the female employees work only periodically, many up to the time when married—others, however, have worked for five to six years. Among 50 questioned, we find 6 that are married and working as partial support to the family. Among the six married, 3 worked near soldering machines and one did hand soldering. Two were childless, one being married six years, the other three and one-half years, the other had one child, having had two miscarriages. Whether the miscarriages were induced or spontaneous we were unable to determine. No conclusion can be made from four cases, but above obstetrical history is characteristic of female lead workers. The average hours of employment is $9\frac{1}{2}$ for females, 10 to 11 for males.

FACTORY CONDITIONS.

One concern has new quarters well ventilated, another is in a large space with monitor type roof, three are in old buildings which were never

intended to house a can factory. A general criticism of all can concerns is, that the employees are compelled to work in a crowded space. One concern occupies four floors. While the height of an ordinary room would be suitable for a stock room or a machine room, it is absolutely inadequate for a workshop where poisonous fumes arise. As our medical inspectors have mentioned before, occupational disease prevention entails not only compliance with the "Occupational Disease Law," but is dependent on the power of the Factory Inspection Department to order simultaneously such measures as are provided in the "Health, Safety and Comfort Law." Low workrooms also add to air vitiation, an abnormally high humidity, dust, and noise. Likewise where shop rooms are crowded and illventilated we usually find unsanitary toilets and washing facilities.

HEALTH HAZARDS OF THE CAN MANUFACTORIES.

The cardinal hazard is lead poisoning. Following is a tabulation of the cases reported for 1913, 1914, 1915 and 1916, manufacture of tinware (can making) :

Year.	Total employed.	Well.	Sick.	Per cent sick.
1912-13.....	3	.....	3	100.
1913-14.....	137	122	15	11.
1914-15.....	279	277	2	.8
1915-16.....	205	204	1	.5

The incidence of lead poisoning as per reports is less than 1 per cent. Compared, however, with other lead trades it may be considered one of the most dangerous occupations, and also one in which it is difficult to effect preventive measures.

The source of plumbism is soldering. The department has repeatedly heard the argument made by evading manufacturers that lead will not volatilize until it reaches 800 to 1,000° F. temperature. One of the medical inspectors has seen 14 cases of lead poisoning in the last two years among solderers, also 2 apprentices near a pot in a linotype concern. The temperature averages 500° F. in all these processes. The employee does not inhale fumes of lead, but is poisoned by lead oxide which is continually forming in metallic lead and even more so when lead is being melted.

The chance of contracting plumbism is greater among employees working near the soldering process. The inspector found 12 soldering machines in a room containing 100 employees, half of which were females. This room was crowded excessively and in it occurred in one month 18 cases of lead poisoning, mostly in girls under 21 years of age. The department designed a hood for horizontal machines as seen in illustrations No. 49 and 50 of our previous Annual Report.

Another cause for plumbism in this industry is the difficulty of maintaining shop discipline. When employees are transients, it is difficult to instill a discipline demanding absolute cleanliness before eating, the changing of working clothes, the use of hand and tooth brushes, etc.

Smoke and Dust.—Smoke and dust are two additional factors to the health hazard. Smoke arising from the machines is a respiratory irritant and for that reason we find among employees of can making concerns

such conditions as pneumonia, bronchitis, nasal catarrh, laryngitis, etc. Because of the lack of organization of employees in this industry, we cannot estimate the incidence of tuberculosis.

Carbon-Monoxid.—This gas also plays a part as a health hazard. Dr. Wm. A. Evans of Chicago referred a machine repairer to the departmental physicians for medical examination. Plumbism was immediately thought of, but on further examination, no evidence of lead poisoning could be found. The diagnosis of chronic carbon-monoxid poisoning was made, because of a polycythemia. The nature of the man's work placed him immediately over the soldering machines in order to make necessary repairs.

Temperature.—The heated conditions of temperature in soldering rooms, together with the large number of employees in one room, causes a high temperature humidity. Employees are frequently sent to other rooms where the temperature is cool, thereby contracting colds, throat infections, pneumonia, and acute arthritis.

ACCIDENTS.

The most common accidents are injuries to the fingers and hands. The machinery is complex in structure and safe-guarding is difficult.

MANIFESTATION OF PLUMBISM AMONG CAN MAKING EMPLOYEES.

The effect of the lead is slow and insidious—women are more often affected than men. Violent acute attacks are not common. Blue lines and wrist drops are not often seen. We observe as the characteristic symptom complex (1) gastric disturbance, (2) constipation, (3) a fine tongue tremor, (4) and anemia.

Prevention of Plumbism.—Especial stress should be laid on the following measures:

1. No eating, where soldering is performed.
2. Exhaust hoods on soldering machines.
3. Hand brushes and proper washing facilities.
4. Monitor style room with high ceilings.
5. Clean workrooms flushed by water every night.

The department recommends, that the Legislature should not allow females to be employed in this industry.

WHITE LEAD.

By George L. Apfelbach, A. B., M. D.

In the State of Illinois we have at the present time four firms engaged in the manufacture of white lead, and we believe that in preventative measures, equipment, laboratories, they will compare most favorably with any similar plants in the United States, with possibly two exceptions, where in certain hazardous phases of handling the corroded lead, notably stack stripping, and the pan rooms, the processes are carried on in manner productive of much less dust. However, after comparison with white lead plants abroad, and especially is this true of Germany and Austria, one cannot but realize that our American systems involve entirely too much handling of the dry lead by the workmen. In comparing our morbidity in this industry to that in Europe it must be taken into consideration that the native workmen in these countries are much more

amenable to shop discipline and this with the prevailing systems of compensation and sickness insurance, with the punishment inflicted for any infractions of shop discipline such as the taking off of respirators, or the eating with dirty hands, all of these factors are more productive of much lower morbidity than in our factories. For example in England or Germany a man once leaded is not permitted to resume work of the same character. Naturally the employer having once paid compensation for a lead paralysis is not anxious to hazard a second attack. We feel, however, that the time is not far distant when our manufacturers will of their own volition recognize the right and necessity of some system of compensation for men engaged in this work. At present this class of labor is a notoriously unstable one, an employee drops out or is lost sight of, only to come to light again as the plaintiff in a civil suit for damages against the company. That there is much malingering cannot be denied, also that a recent decision of the Appellate Court of this State upholding a verdict of 8,000 dollars in a civil suit where the diagnosis of plumbism was at least open to question, has given certain manufacturers much food for thought as to the desirability of a fixed scale of compensation, is not to be doubted. We have a total of approximately 9,000 men reported on monthly to our State Board of Health. These figures include also the dry color workers and paint makers and grinders. We are glad to be able to state that great improvement has been shown in every respect not only as regards personal supervision of the men, but in excellent wash rooms and lavatories.

ARSENIC.

By George L. Apfelbach, A. B., M. D.

In Illinois we are concerned with arsenic as an industrial poison to a very limited extent and this chiefly in two paint and dry color factories engaged in the manufacture of Arsenite of Copper or Paris Green as it is known commercially. Arsenite of Copper is an extremely light, almost impalpable powder, and by virtue of its lightness most difficult to handle. It is most troublesome to handle after precipitation and drying, when it is transferred from the filter press to the bolting room and from here to the kegs and various containers. In the first attempts of the department to deal with this hazard, great difficulty was experienced from two sources. First, poor shop discipline as evidenced in the lack of cleanliness of bolting and packing rooms; also in the employees. Second, by the difficulty of securing a proper exhaust system. There were probably not more than a total of 40 men engaged in this work, but among these the morbidity was so great that the personnel was a constantly changing one. The writer remembers seeing eight men in the county hospital at one time during the first year's operation of the Occupational Disease Act; also of conducting a post mortem on one employee who died of an acute arsenical poisoning after being employed less than two weeks. The most common manifestations of arsenical poisoning are the forms of dermatitis and the scrotal ulcers. Ulcers upon the soles of the feet were also commonly observed, superinduced by perspiration and the boots becoming water soaked. Ulcers upon the mucous membrane of mouth and nose, some of them most severe, were not infrequent. A glance at

the following figures will demonstrate that at the present time this hazard is well under control, owing to strict medical supervision, improved shop discipline, and exhaust systems.

DECALCOMANIA (LITHO TRANSFERS).

By George L. Apfelbach, A. B., M. D.

This industry of which we have one large representative in the State is a disgrace to the country and an eye sore to the department. The particular hazard exists in the employment of young girls, who in the making of transfers dust the "china powder" which contains a large percentage of lead chromate, on the transfers. Women are notoriously more susceptible to plumbism than men, and many severe cases of plumbism have been found in this plant. Prosecution was found necessary to prevent the girls from eating their lunches in the work rooms. The plant is of modern construction, well ventilated and the lavatories adequate—but the element of personal supervision and shop discipline is nil, which aside from the fact that the work is carried on by young girls, is a decisive factor in the morbidity existing at this plant.

STORAGE BATTERIES.

By George L. Apfelbach, A. B., M. D.

The enormous growth of the automobile industry in the past few years has greatly increased the manufacture of storage batteries or accumulators. There are four distinct hazards in this industry, the casting from molten lead, the mixing and weighing of the oxides, the pasting of the plates and the drying. More men are employed in the pasting, and this is in truth the most hazardous phase of this industry. We have numerous small places throughout the State, probably some whose existence we are not aware of, and one large plant employing upwards of 70 men. We consider this plant a model of its kind—all pasting is carried on under a glass hood with an adequate exhaust system. The personal supervision is excellent, as are the lavatories and general equipment for personal hygiene. The mixing and weighing is carried on in a room apart, admirably equipped for taking care of dust and requiring the presence of one man but for short periods.

The following tabulation presents the number of firms reporting to this office under the "Occupational Disease Law" during the fiscal year July 1, 1915, to June 30, 1916. The table further gives the number of men both sick and well reported on for each month in the 18 industrial classifications, which are presented in two main groups, those marked "A," as the lead group, and those marked "B" representing other sources of poisonings.

TABLE NO. 1—OCCUPATIONAL DISEASE REPORTS ACCORDING TO SECTION "4" OF THE OCCUPATIONAL DISEASE LAW SHOWING TOTALS FOR INDUSTRIES.
Summary for 12-month period July 1, 1915, to June 30, 1916.

Disease and industry.	Number of firms reporting.	Number of employees reported on for—																									
		July.		Aug.		Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		Mar.		Apr.		May.		June.			
		Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.		
"A" Lead Poisoning—																											
White Lead.....	4	3	362	1	378	2	388	...	411	...	320	...	428	1	491	2	438	...	306	...	286	...	215	...	192	...	
Smelting and refining.....	29	3	2,871	7	2,957	4	2,908	5	2,857	4	2,944	8	2,969	4	2,885	10	3,071	...	3,029	...	3,056	...	3	2,247	...	1,565	...
Manufacture of paints.....	26	...	326	...	330	...	329	...	329	...	340	1	336	2	348	...	345	...	346	...	356	2	335	2	269	...	
Manufacture of storage bat- teries.....	10	...	102	...	138	...	141	...	140	...	133	...	137	...	148	...	164	...	164	...	178	...	110	...	158	...	
Manufacture of tinware.....	4	...	238	2	245	1	190	...	69	...	199	...	210	2	203	1	253	2	234	2	245	...	242	...	67	...	
Manufacture of car ceals and bearings.....	4	...	194	...	235	...	239	...	219	1	218	27	222	8	221	...	234	1	237	1	238	...	232	...	212	...	
Telephone and switchboards.....	3	...	45	...	56	...	57	...	62	...	64	...	67	...	64	...	72	...	71	...	77	...	77	...	...	...
Painting.....	48	1	963	...	1,049	2	1,076	...	1,129	...	1,251	2	1,328	...	1,299	1	1,409	...	1,368	...	1,365	...	1,204	...	319	...	
Electrotyping.....	2	...	87	...	80	...	59	...	71	...	84	...	89	...	90	...	73	...	101	...	186	...	54	...	...	...
Wallpaper and oilcloth.....	3	...	20	...	21	...	24	...	25	...	28	...	31	...	30	...	30	...	32	...	271	...	21	...	30	...	
Enameling.....	2	...	260	...	117	...	117	...	114	...	140	...	259	...	113	...	271	...	292	...	277	...	262	...	137	...	
Total class "A".....	135	7	5,578	10	5,606	9	5,528	5	5,426	5	5,721	38	5,106	17	6,432	15	6,300	11	6,170	14	6,327	5	4,713	2	2,939	...	
"B" Other Poisonings—																											
Arsenic, paris green, etc.....	2	...	38	...	37	...	35	...	39	...	51	...	74	...	74	...	77	...	1	239	...	219	...	...	...	...
Brass a. Founders.....	65	3	2,175	3	2,200	3	1,919	...	2,125	...	2,080	...	2,055	...	2,108	...	2,228	...	2,305	...	2,177	...	1,688	4	677	...	
b. Spinners, polishers, etc.....	27	...	863	...	873	...	902	...	922	...	719	2	974	...	761	...	901	...	902	...	772	...	580	1	331	...	
Plating and electrotyping.....	16	...	143	...	253	...	192	2	195	...	206	...	214	...	241	...	229	...	239	...	241	...	171	...	57	...	
Decalcomania.....	1	...	3	...	6	...	6	...	8	...	3	...	8	...	3	...	7	...	7	...	38	...	5	...	...
Galvanizing.....	5	...	33	...	90	...	36	...	30	...	33	...	36	...	37	...	37	...	38	...	38	...	10	...	37	...	
Mercury (fulminate of mer- cury).....	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	24	...	32	...	...	...
Total class "B".....	115	3	3,255	3	3,399	3	3,890	2	3,314	...	3,066	2	8,467	3	3,226	...	3,476	...	3,630	...	3,479	...	2,426	5	1,102	...	
Grand total.....	250	10	8,833	13	9,005	12	9,418	7	8,740	5	8,817	40	3,361	20	9,658	15	9,836	12	9,800	14	9,806	5	7,139	7	4,041	...	

Table No. 2, which follows shows the number of sick cases reported, the occupations, the diagnosis, the duration of sickness, etc., for each industry.

Number of employees reported on.						Occupation of employee reported sick.	Diagnosis of employee reported sick.	Acute or chronic.	Mild or severe.	Probable duration.
Apr.		May.		June.						
Sick.	Well.	Sick.	Well.	Sick.	Well.					
..	100	..	..	100	..	Millwright.....	Colic.....	A	M	2 days.
..	..	..	..	..	..	..do.....	..do.....	A	M	2 days.
..	..	..	..	..	..	Coppersmith.....	Colic, slow pulse.....	A	M	10 days.
..	..	..	..	..	..	..do.....	..do.....	A	M	10 days.
..	..	..	..	..	..	Helper.....	..do.....	A	M	10 days.
..	70	..	..	..	..	Lead drawer.....	Colic, constipation.....	A	M	14 days.
..	116	..	110	92	..	..do.....	..do.....	A	M	7 days.
..	..	..	..	..	..	Pan room.....	Blue line, constipation, nausea, pallor, coated tongue.....	A	M	22 days.
..	..	..	105	..	..	Lead drawer.....	Abdominal tenderness, loss muscular strength, blue line, constipation, high tension pulse.....	A	M	Indef.
..	286	..	215	192	..	..	..	..	..	..
..	6	..	5	6	..	..	..	..	..	..
..	1	..	1	1	..	..	..	..	..	..
..	300	..	300	300	..	..	..	..	..	..
..	9	..	8	13	..	..	..	..	..	..
..	30	..	30	..	..	Tin caster.....	Blue line, colic.....	A	M	7 days
..	..	..	..	..	..	..do.....	Blue line, loss weight.....	A	M	..
..	1	..	..	..	..	..	..	..	..	..
..	4	..	4	4	..	Ore mixer.....	Colic, slight anaemia, Hgm. 85 per cent.....	A	M	..
..	..	..	..	..	..	Furnace tapper.....	Colic, anaemia Hgm. 75 per cent.....	C	M	..
..	..	..	..	..	..	Open hearth.....	Colic.....	C	M	3 days.
..	..	..	..	..	..	..do.....	Colic, constipation, slow pulse.....	A	M	3 days.
..	..	..	..	..	..	..do.....	Mild cramps, slow pulse, constipation.....	A	M	2 days
..	..	..	..	..	..	..do.....	Loss weight, muscular weakness.....	A	M	..
..	..	..	..	..	..	..do.....	Loss weight, anaemia, slow pulse.....	C	M	..
..	..	..	..	..	..	..do.....	Loss strength, anaemia, high tension pulse, slow pulse, loss weight.....	C	M	..
..	..	..	..	..	..	..do.....	Loss strength, dyspepsia, muscular pains.....	C	M	30 days.
..	..	..	..	..	..	..do.....	Slow pulse, constipation, lumbago.....	C	M	..
..	..	..	..	..	..	Furnace tender.....	Anaemia, constipation, nausea.....	C	M	..
..	..	..	..	..	..	Motor man.....	Indigestion, indefinite pains.....	C	M	7 days.
..	..	..	..	..	..	H. and H. floor.....	Muscular weakness of hands.....	C	M	Indef.
..	..	..	..	..	..	Crushing mill.....	Abdominal tenderness, constipation, high tension pulse, headache, pallor.....	C	M	..
..	..	..	..	..	..	Open hearth.....	Muscular pains, anaemia, rapid pulse.....	C	M	Indef.
..	..	..	..	..	..	..do.....	Colic, constipation, slow pulse.....	C	M	3 days.
..	..	..	..	..	..	Blast furnace.....	Anaemia, abdominal tenderness, constipation, muscular pains.....	C	M	10 days.
..	..	..	..	..	..	Pot man.....	Anaemia, abdominal pains, colic, constipation, dyspepsia, headache, nausea, pallor Hgm. 75 per cent.....	A	M	7 days.
..	..	..	..	..	..	H. and H pots.....	Abdominal tenderness, dyspepsia, slow pulse.....	C	M	14 days.
3	468	..	..	..	..	Open hearth.....	Anaemia, blue line, constipation, dyspepsia, loss weight, pallor.....	C	M	..
..	..	..	..	..	..	Machine operator.....	Wrist drop, tremors.....	C	M	Indef.
..	..	..	..	..	..	Holst man.....	Loss muscular strength, anaemia, Hgm. 75 per cent.....	C	M	Indef.
..	..	2	412	..	..	Switchman.....	Constipation, dyspepsia, slow pulse, headache, nausea.....	A	M	3 days.
..	..	..	..	..	..	Open hearth.....	Loss strength, colic, constipation, slow pulse.....	A	M	3 days.
..	18	..	18	18	..	..	..	..	..	..
..	40	..	40	40	..	..	..	..	..	..
..	86	..	..	..	..	..	..	..	..	..
..	35	..	55	55	..	..	..	..	..	..
..	18	..	18	16	..	..	..	..	..	..
..	250	..	..	..	..	..	..	..	..	..

-Continued.

Number of employees reported on.						Occupation of employee reported sick.	Diagnosis of employee reported sick.	Acute or chronic.	Mild or severe.	Probable duration.
Apr.		May.		June.						
Sick.	Well.	Sick.	Well.	Sick.	Well.					
..	47	..	..	..	..	Dross furnace.....	Loss muscular strength, colic, blue line, constipation, coated tongue..	A	M	
..	188	..	..	192	..					
..	138	..	138	150	..	Oxide plant.....	Colic, blue line, constipation, slow pulse, pallor, etc.....	A	M	Indef.
..	273	..	..	..	..	Ore crusher.....	Loss strength, abdominal tenderness, colic, constipation, slow pulse, pallor.....	A	M	Indef.
..	..	..	..	..	..	Roast kiln.....	..do.....	A	M	Indef.
..	..	..	..	..	..	Crusher.....	Abdominal tenderness, colic, blue line, pallor, coated tongue.....	A	M	Indef.
..	..	..	..	..	..	Oxide plant.....	Loss strength, anaemia, abdominal tenderness, colic, pallor.....	A	S	Indef.
..	..	..	..	..	..	Retort.....	Loss strength, anaemia, abdominal tenderness, colic, coated tongue...	A	M	Indef.
..	..	..	..	..	..	Spelter furnace...	Colic, blue line, constipation, pallor.	A	M	Indef.
..	..	..	..	..	..	..do.....	Abdominal tenderness, colic, blue line, constipation, pallor.....	A	M	Indef.
..	..	..	..	..	..	Dumper.....	Abdominal tenderness, colic, blue line, constipation, coated tongue, eruptions.....	A	M	Indef.
..	..	..	..	..	..	Machine.....	Colic, blue line, constipation, coated tongue.....	A	M	Indef.
..	..	..	..	..	..	Charger.....	Abdominal tenderness, colic, blue line, constipation, coated tongue, vertigo.....	A	S	Indef.
4	526	..	..	..	..	Bag house.....	..do.....	A	M	Indef.
..	..	..	..	..	..	Spelter furnace...	Anaemia, abdominal tenderness, colic, blue line, constipation, pallor	A	M	Indef.
..	..	..	..	..	..	Ore crusher.....	Anaemia, abdominal tenderness, colic, blue line.....	A	M	Indef.
..	..	..	..	..	..	Bag house.....	Abdominal tenderness, colic, blue line, constipation, pallor.....	A	M	Indef.
..	1	529	..	..	..	..do.....	Loss strength, anaemia, abdominal tenderness, colic, blue line.....	A	M	Indef.
..	180	180	..	..	..		
..	43	26	..	20	..	Kettleman.....	Anaemia, colic, constipation, pallor, coated tongue.....	A	M	30 days.
..	8	8	8	8	8	Foreman.....	Loss strength, anaemia, blue line, constipation, pallor.....	A	M	30 days.
..	..	..	..	..	..	Furnace.....	Eruptions.....	A	S	30 days.
..	..	..	..	..	..	Charge wheeler...	Slow pulse, nausea, colic, constipation, pallor, coated tongue.....	A	M	7 days.
..	..	..	..	..	..	Helper S. H.....	Colic, constipation, slow pulse, nausea, coated tongue.....	A	S	10 days.
..	..	..	..	..	..	..do.....	Colic, constipation, nausea, coated tongue, slow pulse.....	A	M	4 days.
..	..	..	..	..	..	Tapper.....	Colic, constipation, tremors, slow pulse, nausea.....	A	S	14 days.
..	..	..	..	..	..	D. and L. roaster..	Colic, constipation, slow pulse, nausea, pallor, coated tongue.....	A	M	4 days.
..	..	..	..	..	..	Lead mixer.....	Colic, constipation, slow pulse, headache, nausea, pallor.....	A	M	5 days.
..	..	..	..	..	..	Feeder.....	Colic, constipation, slow pulse, nausea, pallor, coated tongue.....	A	S	8 days.
..	..	..	..	..	..	Tapper.....	..do.....	A	M	3 days.
..	..	..	..	..	..	Charge wheeler...	..do.....	A	M	4 days.
..	..	..	..	..	..	..do.....	Colic, constipation, slow pulse, headache, nausea, pallor.....	A	M	3 days.
..	..	..	..	..	..	Bag shaker.....	Colic, constipation, slow pulse, nausea, pallor, coated tongue.....	A	M	3 days.
1	351	410	371	..	..	Charge wheeler...	..do.....	A	S	10 days.
..	35	65	..	..	..	Helper S. H.....	..do.....	A	M	7 days.
8	3,056	3,247	1,565	..	..			
..	6	8	8	..	..			
..	22	22	22	..	..			
..	20	20	20	..	..			

- Continued.

Number of employees reported on.						Occupation of employee reported sick.	Diagnosis of employee reported sick.	Acute or chronic.	Mild or severe.	Probable duration.
Apr.		May.		June.						
Sick.	Well.	Sick.	Well.	Sick.	Well.					
..	37	..	33	..	30					
..	28	..	27	..	27					
..	26	..	26	..	26					
..	5	..	5	..	5	Dry color.....	Abdominal tenderness, pallor, loss appetite.....	A	M	Indef.
..		..		..		White lead.....	Abdominal tenderness, colic, stomachache.....	A	M	Indef.
1	10	..		..		Paint mixer.....	Loss strength, anaemia, abdominal tenderness, dyspepsia, loss weight, nausea, pallor.....	A	M	Indef.
..		2	15	..		Dry color.....	Anaemia, blue line, coated tongue..	A	M	Indef.
..	2	..	4	..	6	Paint mixer.....	Colic.....	A	M	Indef.
..	21	..	21	..						
..	12	..		..	6					
..		..		..		do.....	Loss strength, anaemia, abdominal tenderness, colic, constipation, nausea, coated tongue.....	A	M	21 days.
..	36	..	37	1	33	Charer	Loss strength, abdominal tenderness, colic, constipation, dyspepsia, loss weight, nausea.....	A	M	Indef.
..	7	..	7	1	3	Paint mixer.....	Loss strength, anaemia, colic, blue line, constipation, pallor.....	A	M	21 days.
..	13	..	10	..						
..	17	..	17	..	19					
..	5	..	5	..	5					
..	16	..	16	..	16					
..	2	..	2	..						
..							
..		..	29	..						
..	19	..		..	16					
..	12	..		..			
..	3	..	2	..	2					
..	20	..	20	..	20					
..	5	..	5	..						
..	7	..	6	..	6					
..	356	2	335	2	269					
..	2	..	2	..						
..	3	..	4	..	5					
..		..	8	..	8					
..	3	..	3	..	3					
..	4	..		..			
..	14	..	14	..	14	Paster.....	Anaemia, colic, blue line, constipation, pallor.....	A	M	30 days.
..	108	..	65	..	95	do.....	Anaemia, colic, constipation, coated tongue.....	A	M	30 days.
..		..		..		do.....	Anaemia, blue line, constipation, pallor.....	A	M	30 days.
..		..		..		do.....	Anaemia, blue line, high tension pulse, pallor.....	A	M	30 days.
..		..		..		do.....	Anaemia, blue line, constipation, pallor.....	A	M	30 days.
..	14	..	14	..	14					
..	11	..		..			
1	19	..		..	19	Lead burner	Bronchitis.....	C	M	Indef.
1	178	..	110	..	158					
..		..		..		Can cleaner.....	Loss muscular strength, abdominal tenderness, colic, blue line, constipation, dyspepsia.....	C	M	Indef.
..		..		..		Solder machine...	Loss muscular strength, abdominal tenderness, anaemia, colic, constipation, dyspepsia.....	A	M	Indef.
3	147	..	150	..		Painter.....	Colic.....	A	M	14 days.
..		..		..		Sweeper.....	Abdominal tenderness, constipation, tremor, dyspepsia, coated tongue..	A	M	Indef.

-Continued.

Number of employees reported on.						Occupation of employee reported sick.	Diagnosis of employee reported sick.	Acute or chronic.	Mild or severe.	Probable duration.
Apr.		May.		June.						
Sick.	Well.	Sick.	Well.	Sick.	Well.					
..	Can cleaner.....	Blue line, constipation, diarrhoea, coated tongue.....	A	M	Indef.
..	47	..	34	..	..	Solderer.....	Colic, diarrhoea.....	A	M	Indef.
..	Can tester.....	Conjunctivitis.....	A	M	Indef.
..	Solderer.....	Muscular tremor.....	A	M	Indef.
..do.....	..do.....	A	M	Indef.
..do.....	Blue line, slow pulse.....	C	M	Indef.
..	61	..	58	..	67	Foreman Asst.....	Loss of weight.....	C	M	Indef.
3	245	..	242	..	67					
..	Liner.....	Anaemia, colic, blue line, constipation, high tension pulse, pallor, coated tongue.....	A	M	30 days.
..	Laborer.....	Anaemia, blue line, constipation, pallor, coated tongue.....	C	M	30 days.
..	Liner.....	..do.....	A	M	30 days.
..	Moulder.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..	Bore mill.....	Anaemia, colic blue line, constipation, pallor, coated tongue.....	A	M	30 days.
..	Laborer.....	Loss muscular strength, anaemia, blue line, constipation, pallor, coated tongue.....	A	M	30 days.
..do.....	..do.....	C	M	30 days.
..	Moulder.....	..do.....	A	M	30 days.
..	Liner.....	..do.....	A	M	30 days.
..	Moulder.....	..do.....	A	M	30 days.
..	Liner.....	..do.....	A	M	30 days.
..	Moulder.....	..do.....	A	M	30 days.
..	Laborer.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..	Furnace.....	..do.....	A	M	30 days.
..	Laborer.....	..do.....	A	M	30 days.
..	Foreman.....	..do.....	A	M	30 days.
..	Laborer.....	Anaemia, blue line, constipation, jaundice, coated tongue.....	A	M	30 days.
..do.....	Anaemia, colic, blue line, constipation, pallor, coated tongue.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..	Liner.....	..do.....	A	M	30 days.
..	Laborer.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..do.....	Anaemia, colic, blue line, constipation, pallor, coated tongue.....	A	M	30 days.
..do.....	Anaemia, blue line, constipation, high tension pulse, pallor, coated tongue.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..	Moulder.....	..do.....	A	M	30 days.
..	Laborer.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..do.....	Anaemia, blue line, constipation, high tension pulse, pallor, coated tongue and colic.....	A	M	30 days.
..do.....	..do.....	A	M	30 days.
..	Elec. furnace.....	Anaemia, colic, high tension pulse, pallor, coated tongue.....	A	M	30 days.
1	219	..	210	..	200	Furnace tender...	Anaemia, colic, blue line, constipation, high tension pulse, pallor, coated tongue.....	A	M	30 days.
..	12	..	12	..	12		Anaemia, colic, blue line, constipation, high tension pulse, pallor, coated tongue.....	A	S	30 days.
..	7	..	..	..	..	
1	238	..	222	..	212					

TABLE NO. 2

Disease and industry.	Firms reporting.	Number of employees reported on.																	
		July.		Aug.		Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		Mar.	
		Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.
Telephone and switchboards:	1..	18	18	18	18	26	26	26	26	26	26	26	26	26	27	27	27	27	30
	1..	9	12	13	13	10	10	10	10	12	15	15	11	11	15	15	15	15	14
Total	3..	45	56	57	57	62	62	64	64	67	67	67	64	64	72	72	71	71	71
Painting:	1..	10	15	16	12	13	13	13	13	13	13	12	12	14	14	15	15	15	15
	1..	8	7	7	7	7	7	7	7	7	7	7	5	5	6	6	6	6	7
	1..	27	19	19	29	19	19	19	19	19	19	17	17	16	16	25	25	25	25
	1..	28	25	23	19	14	14	14	14	14	14	11	11	16	16	20	20	20	20
	1..	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	1..	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	1..	6	6	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	1..	4	5	3	5	5	5	5	5	5	5	7	7	6	6	6	6	6	6
	1..	7	7	7	7	7	7	7	7	7	7	4	4	4	4	4	4	4	3
	1..	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	1..	5	5	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5
	1..																		
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Number of employees reported on.						Occupation of employee reported sick.	Diagnosis of employee reported sick.	Acute or chronic. Mild or severe.	Probable duration.
Apr.		May.		June.					
Sick.	Well.	Sick.	Well.	Sick.	Well.				
..	30	..	..	..	..
..	28	..	..	..	..
..	19	..	..	..	..
..	77	..	..	..	..
..	16	..	13	..	10				
..	7	..	7	..	..		
..	20	..	..	..	22				
..	28	..	27	..	30				
..	4	..	4	..	4				
..	9	..	9	..	8	Painting	Wrist drop.....	C S	Indef.
..	6	..	6	..	6				
..	7	..	6	..	6				
..	4	..	4	..	5				
..	10	..	10	..	10				
..	5	..	..	..	5				
..	44	..	30	..	..		
..	25	..	25	..	..		
..	114	..	..	..	71				
..	12	..	12	..	12				
..	11	..	12	..	..		
..	2	..	2	..	2				
..	11	..	11	..	..		
..	10	..	10	..	..		
..	24	..	..	..	..
..	..	..	18	..	..		
..	22	..	..	..	..	Assembler.....	Loss muscular strength, colic, blue line, constipation, slow pulse, coated tongue.....	A M	Indef.
..	72	..	54	..	..		
..	34	..	38	..	..		
..	57	..	60	..	..		
..	23	..	20	..	..		
..	20	..	..	..	20				
..	9	..	9	..	9				
..	33	..	36	..	36				
..	19	..	10	..	10				
..	9	..	9	..	9				
..	12	..	..	..	..	Painter.....	Anaemia, blue line, constipation, loss weight.....	C M	Indef.
..	..	..	..	..	..	Benzine cleaner....	Scaling dermatitis in both hands....	A S	10 days.
..	598	..	645	..	..	Fusing lead.....	Cramps, constipation, metallic taste.	A M	7 days.
..	10	..	10	..	..	Lead burner.....	Abdominal pains, slight blue line...	A M	5 days.
..	27	..	27	..	27				
..	14	..	11	..	..		
..	9	..	..	..	..
..	14	..	14	..	..		
..	22	..	22	..	..		
..	6	..	..	..	..
..	3	..	..	..	..
..	10	..	17	..	17				
..	8	..	7	..	..		
..	1,395	..	1,204	..	319				
..	26	..	..	..	..
..	172	..	54	..	..		
..	198	..	54	..	..		
..	20	..	21	..	21				
..	1	..	1	..	1				
..	..	..	..	..	8				
..	21	..	22	..	30				

TABLE NO. 2

Disease and industry.	Firms reporting.	Number of employees reported on.																	
		July.		Aug.		Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		Mar.	
		Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.
Enameling:	1	..	..	..	..	..	..	..	..	..	..	114	..	..	..	124	..	189	
	1	..	260	..	117	..	117	..	114	..	140	..	145	..	113	..	147	..	153
Total	2	..	260	..	117	..	117	..	114	..	140	..	259	..	113	..	271	..	282
Total Class "A"	135	7	5,518	10	5,606	9	5,528	5	5,426	5	5,721	38	5,106	17	6,432	15	6,360	11	6,170
"B" Other poisonings—Arsenic, Paris green:	1	..	3	..	2	..	2	..	2	..	3	..	4	..	4	..	5	..	..
	1	..	35	..	35	..	33	..	37	..	48	..	70	..	70	..	72	1	239
Total	2	..	38	..	37	..	35	..	39	..	51	..	74	..	74	..	77	1	239
Brass foundries:	1	..	168	..	189	..	189	..	196	..	208	..	266	..	242	..	322	..	294
	1	..	7	..	7	..	7	..	7	..	7	..	7	..	7	..	7	..	7
	1	..	47	..	47	1	46	..	44	..	46	..	47	..	52	..	54	..	54
	1	..	99	..	98	..	88	..	92	..	95	..	89	..	96	..	109	..	111
	1	..	..	..	..	..	..	..	..	..	3	..	3	..	3	..	3	..	3
	1	..	20	..	18	..	18	..	20	..	20	..	20	..	21	..	24	..	27
	1	..	13	..	13	..	13	..	18	..	18	..	18	..	19	..	15	..	14
	1	..	9	..	9	..	5	..	5	..	7	..	8	..	8	..	9	..	7
	1	..	18	..	19	..	21	..	21	..	21	..	21	..	21	..	22	..	21
	1	..	12	..	12	..	12	..	12	..	12	..	12	..	12	..	12	..	12
	1	..	56	..	56	..	58	..	58	..	58	..	63	..	68	..	73	..	79
	1	..	4	..	4	..	4	..	4	..	4	..	7	..	4	..	5	..	7
	1	..	163	..	165	..	165	..	166	..	164	..	159	..	160	..	161	..	164
	1	2	98	..	98	..	98	..	101	..	98	..	98	..	99	..	104	..	105
	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1	..	20	..	18	..	19	..	17	..	17	..	15	..	15	..	14	..	15
	1	..	19	..	19	..	20	..	22	..	23	..	23	..	23	..	21	..	22
	1	..	10	..	10	..	11	..	11	..	10	..	10	..	9	..	9	..	9
	1	..	6	..	6	..	5	..	5	..	5	..	5	..	5	..	6	..	6
	1	..	10	..	10	1	10	..	10	..	10	..	7	..	7	..	9	..	9
	1	..	121	..	125	..	118	..	117	..	116	..	115	..	118	..	88	..	107
	1	..	14	..	25	..	27	..	27	..	27	..	27	..	27	..	20	..	20
	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	4
	1	..	4	..	4	..	4	..	4	..	4	..	4	..	4	..	4	..	4
	1	..	3	..	3	..	3	..	3	..	3	..	3	..	3	..	3	..	3
	1	..	2	..	3	..	3	..	3	..	4	..	3	..	3	..	3	..	3
	1	..	1	..	2	..	2	..	2	..	..	..	..	..	..	..	..	..	..
	1	..	10	..	14	..	12	..	10	..	11	..	10	..	10	..	..	..	11
	1	..	13	..	13	..	12	..	12	..	12	..	14	..	14	..	16	..	12
	1	..	152	..	134	..	140	..	141	..	127	..	146	..	148	..	150	..	147
	1	1	44	..	50	..	50	..	52	..	54	..	57	..	57	..	58	..	61
	1	..	118	..	137	2	128	..	129	..	94	..	95	..	78	..	84	..	86
	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1	..	17	..	17	..	17	..	17	..	17	..	20	..	20	..	20	..	20
	1	..	4	..	4	..	5	..	5	..	6	..	12	..	12	..	11	..	12
	1	..	13	..	13	..	13	..	14	..	14	..	14	..	15	..	15	..	14
	1	..	5	..	5	..	4	..	4	..	4	..	5	..	4	..	4	..	4
	1	..	6	..	6	..	6	..	6	..	6	..	6	..	6	..	10	..	10
	1	..	90	..	86	..	86	..	70	..	70	..	..	..	..	..	..	..	..
	1	..	8	..	8	..	6	..	9	..	9	..	9	..	9	..	..	..	9
	1	..	13	..	13	..	12	..	11	..	11	..	12	..	11	..	13	..	14
	1	..	6	..	6	..	6	..	6	..	6	..	6	..	6	..	6	..	6
	1	..	8	..	8	..	8	..	8	..	8	..	..	..	..	..	..	..	..
	1	..	6	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1	..	..	..	..	..	5	..	5	..	6	..	6	..	6	..	6	..	6
	1	..	74	..	74	..	77	..	72	..	77	..	79	..	80	..	79	..	78
	1	..	46	..	55	..	59	..	59	..	60	..	54	..	53	..	59	..	63
	1	..	49	..	40	..	61	..	61	..	58	..	60	..	54	..	54	..	63
	1	..	15	..	15	..	15	..	15	..	15	..	15	..	15	..	15	..	15
	1	..	19	..	18	..	19	..	19	..	19	..	21	..	25	..	25	..	24
	1	..	10	..	10	..	13	..	12	..	12	..	12	..	12	..	13	..	9
	1	..	6	..	6	..	6	..	6	..	6	..	6	..	6	..	6	..	6
	1	..	99	..	97	..	90	..	94	..	99	..	96	..	93	..	92	..	100
	1	..	..	..	..	..	72	..	8	..	69	..	85	..	74	..	86	..	8
	1	..	9	..	8	..	9	..	..	..	..	..	9	..	6	..	8	..	8
	1	..	..	..	31	..	29	..	..	..	17	..	31	..	35	..	39	..	41

-Continued.

Number of employees reported on.						Occupation of employee reported sick.	Diagnosis of employee reported sick.	Acute or chronic.	Mild or severe.	Probable duration.
Apr.		May.		June.						
Sick.	Well.	Sick.	Well.	Sick.	Well.					
..	127	..	124	..	..			
..	150	..	138	..	127					
..	277	..	262	..	127					
14	6,327	5	4,713	2	2,939					
..	219	..	..	..	..	Grinder	Constipation, headache, pallor, jaundice.....	A	M	7 days.
..	219	..	..	..	..	
..	255	..	233	..	..			
..	7	..	7	..	7					
..	57	..	57	..	56	Plater helper.....	Dermatitis	A	M	14 days.
..	108	..	131	..	..			
..	3	..	3	..	..			
..	28	..	..	..	..	
..	15	..	..	..	..	
..	8	..	..	..	..	
..	18	..	17	..	17					
..	12	..	..	..	..	
..	73	..	65	..	..			
..	163	..	6	..	6					
..	106	..	104	..	108	Liner car brasses.	Constipation, artheritis, headache, sciatica, albuminuria.....	C	M	Indef.
..	..	..	..	..	..	Stencil washer....	Anaemia, blue line, paralysis, atrophy of muscles, tremor.....	C	S	Indef.
..	16	..	19	..	20					
..	21	..	20	..	..			
..	11	..	10	..	10					
..	6	..	6	..	6					
..	8	..	..	..	..	
..	111	..	..	..	..	
..	26	..	..	..	..	
..	5	..	5	..	..			
..	4	..	..	..	..	
..	4	..	4	..	4					
..	3	..	3	..	3					
..	10	..	..	..	..	
..	13	..	13	..	17					
..	163	..	..	..	..	
..	77	..	56	..	60	Plater.....	Dermatitis	A	M	Indef.
..	20	..	80	..	..	Laborer.....	Anaemia, blue line.....	A	M	Indef.
..	9	..	..	..	..	Furnace tender....	do.....	C	M	Indef.
..	13	..	20	..	7					
..	4	..	17	..	..			
..	10	..	10	..	..			
..	8	..	..	..	..	
..	9	..	10	..	..			
..	6	..	9	..	..			
..	5	..	6	..	..			
..	79	..	82	..	..			
..	58	..	54	..	..			
..	53	..	52	1	52	Painter.....	Neuritis.....	C	M	30 days.
..	15	..	10	..	..			
..	22	..	21	..	19					
..	9	..	10	..	11					
..	6	..	6	..	6					
..	132	..	..	..	..	
..	80	..	..	..	..	
..	36	..	8	..	..			
..	..	..	29	..	..			

TABLE NO. 2

Disease and industry.	Firms reporting.	Number of employees reported on.											
		July.		Aug.		Sept.		Oct.		Nov.		Dec.	
		Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.	Sick.	Well.
Brass foundries— Concluded.	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	55	78	44	70	63	74	78	86	21	21	21	21
	1	18	18	18	20	20	20	20	21	21	21	21	21
	1	6	6	6	6	6	6	6	6	6	6	6	6
	1	5	5	5	5	5	5	5	5	5	5	5	5
	1	11	10	10	7	6	7	7	7	7	7	7	7
	1	310	304	94	77	74	92	109	104	24	24	24	24
	1												
	1												
	1	5	6	6	6	5	4	4	4	4	4	4	4
Total.....	65	3	2,175	3	2,200	3	1,919	2,125	2,080	2,055	2,108	2,228	2,205
	1		6						7				7
	1	8	10	14	14	15	13	13	13	13	13	13	13
	1	109	111	110	129	2	133	135	123	118	118	118	118
	1	7	8	8	8	8	10	9	9	10	10	10	10
	1	55	51	55	53	51	51	53	52	50	50	50	50
	1	59	59	50	54	55	54	54	56	55	55	55	55
	1	6	6	6	6	6	6	6	6	6	6	6	6
	1	7	7	7	7	7	7	7	7	7	7	7	7
	1	3	3	3	4	5	5	5	5	5	5	5	5
Brass founders, spinners and pol- ishers:	1	44	45	46	47	48	49	49	49	49	49	49	49
	1	31	30	36	39	26	40	40	42	43	43	43	43
	1	17	17	17	19	19	19	19	19	19	19	19	19
	1	7	7	7	7	7	7	7	7	7	7	7	7
	1	189	194	198	201	106	244	19	186	215	215	215	215
	1	8	8	11	12	12	11	11	12	12	12	12	12
	1	17	18	20	19	19	18	18	18	19	19	19	19
	1	3	3	3	3	3	3	3	3	3	3	3	3
	1	4	4	4	4	4	6	5	4	4	4	4	4
	1	25	25	25	25	25	25	25	25	25	25	25	25
Total.....	27	863	873	902	922	719	2	974	761	901	902	902	902
	1												
	1	10	10	10	10	10	10	10	10	10	10	10	10
	1	16	16	16	16	16	16	16	16	16	16	16	16
	1	3	3	3	3	3	3	3	3	3	3	3	3
	1	3	3	3	3	3	3	3	3	3	3	3	3
	1	20	21	20	20	27	27	27	29	30	30	30	30
	1								28	28	28	28	28
	1	7	7	7	7	7	7	7	7	7	7	7	7
	1	7	7	7	7	7	7	7	7	7	7	7	7
Plating and electro- plating:	1	10	10	10	10	10	10	10	10	10	10	10	10
	1	17	17	17	17	17	17	17	15	17	17	17	17
	1												
	1												
	1												
	1												
	1												
	1												
	1												
	1												
Total.....	105	46	50	50	50	51	55	58	28	28	28	28	28

—Continued.

Number of employees reported on.						Occupation of employee reported sick.	Diagnosis of employee reported sick.	Acute or chronic.	Mild or severe.	Probable duration.
Apr.		May.		June.						
Sick.	Well.	Sick.	Well.	Sick.	Well.					
..	93	..	130	..	1					
..	23	..	23	..	21					
..	6	..	6	..	6					
..	7	..	6	..	7					
..	..	..	..	..	..	Furnace tender....	Anaemia, colic, lead line.....	A	M	Indef.
..	..	..	..	..	..	..do.....	Colic, blue line, constipation.....	A	M	Indef.
..	..	..	..	..	..	..do.....	Colic, blue line, anaemia, constipation.....	A	M	Indef.
..	106	..	110	..	100	Laborer.....	Anaemia, colic, blue line.....	A	M	Indef.
..	5	..	3	..	3					
..	27	..	..	..	..	
..	..	..	4	..	130	Helper.....	Loss muscular strength, anaemia, tremors, high tension pulse, pallor.....	C	M	Indef.
..	..	..	..	..	..	Brass moulder....	Constipation, neuritis, conjunctivitis.....	C	M	Indef.
..	..	..	..	..	..	..do.....	Loss muscular strength, anaemia, constipation, tremors, high tension pulse, loss weight.....	C	M	Prmnt.
..	..	..	..	..	..	..do.....	Loss muscular strength, anaemia, constipation, tremors, high tension pulse, loss weight, and acute arthritis.....	C	M	Indef.
..	2,177	..	1,628	4	677					
..	13	..	..	..	..	
..	9	..	111	..	121	Polisher.....	Chills, vertigo, colic.....	A	M	14 days.
..	47	..	8	..	..	Helper.....	Chills, colic, headache.....	A	M	14 days
..	56	..	55	..	55					
..	6	..	6	..	6					
..	7	..	3	..	..			
..	5	..	..	..	..	
..	50	..	..	..	..	
..	37	..	36	..	..			
..	19	..	..	..	..	
..	7	..	4	..	..			
..	177	..	179	..	..			
..	12	..	..	..	..	
..	18	..	18	..	..			
..	3	..	..	..	..	
..	4	..	6	..	6					
..	25	..	25	..	25					
..	8	..	8	..	..			
..	26	..	24	..	..			
..	35	..	40	..	..			
..	43	..	46	1	51	Helper.....	Abdominal tenderness, colic, tremor, high tension pulse, pallor, coated tongue.....	A	M	Indef.
..	6	..	10	..	..			
..	146	..	..	..	..	
..	..	..	1	..	67					
..	772	..	580	1	331					
..	22	..	..	..	..	
..	10	..	..	..	..	
..	16	..	16	..	16					
..	3	..	3	..	3					
..	..	..	3	..	..			
..	21	..	..	..	..	
..	26	..	..	..	..	
..	7	..	7	..	..			
..	10	..	..	..	..	
..	17	..	17	..	17					
..	38	..	42	..	..			

—Concluded.

Number of employees reported on.						Occupation of employee reported sick.	Diagnosis of employee reported sick.	Acute or chronic.	Mild or severe.	Probable duration.
Apr.		May.		June.						
Sick.	Well.	Sick.	Well.	Sick.	Well.					
..	19	..	20	..	21					
..	..	..	23	..	..	Metal dipper.....	Anaemia, abdominal tenderness, constipation, coated tongue.....	C	M	3 months.
..	40	..	40	..	..	Lacquering	Abdominal tenderness, constipation, dyspepsia.....	C	M	Indef.
..					
..	241	..	171	..	57					
..	7	..	5	..	..	China department worker	Nausea, constipation, abdominal pain.....	C	M	Indef.
..	..	..	..	..	..	do	do	C	M	Indef.
..	..	..	..	..	..	do	do	C	M	Indef.
..	7	..	5	..	..			
..	5	..	..	..	5					
..	10	..	10	..	10					
..	24	..	..	..	22					
..	39	..	10	..	37					
..	24	..	32	..	..			
..	24	..	32	..	..			
..	3,479	..	2,426	5	1,102					
14	9,806	5	7,139	7	4,041					

Table No. 3 shows the number of firms reporting in each industry and the number of sick employees upon which medical examinations were made and reported to this office during each year since the "Occupational Disease Law" became effective.

TABLE NO. 3—NUMBER OF OCCUPATIONAL DISEASE CASES REPORTED SINCE LAW BECAME EFFECTIVE, BY INDUSTRIES.

Industry.	July 1, 1912, to June 30, 1913.		July 1, 1913, to June 30, 1914.		July 1, 1914, to June 30, 1915.		July 1, 1915, to June 30, 1916.	
	Number of cases re- ported.	Number of estab- lish- ments re- porting.	Number of cases re- ported.	Number of estab- lish- ments re- porting.	Number of cases re- ported.	Number of estab- lish- ments re- porting.	Number of cases re- ported.	Number of estab- lish- ments re- porting.
Manufacture of white lead.....	16	4	19	4	6	4	9	4
Smelting and refining.....	166	8	72	27	136	29	59	29
Manufacture of paints.....	16	12	18	24	4	24	9	26
Manufacture of storage batter- ies.....	3	5	1	10	3	10	6	10
Manufacture of tinware.....	3	1	184	4	28	3	11	4
Manufacture of car seals and bearings.....	62	2	28	4	6	4	38	4
Manufacture of telephones and switchboards.....		2		3		2		3
Paintings.....	3	8	30	48	11	56	6	48
Electrotyping.....		5		4	1	2		2
Wall paper and oil cloth.....		3		3		3		3
Enameling.....		2	3	4	1	4		2
Total for lead class.....	269	52	355	135	196	141	138	135
Arsenic, Paris green, etc.....	27	2	13	1	1	2	1	2
Brass: (a) Founders.....	4	23	2	52	12	58	13	65
(b) Spinners, polishers, etc.....	6	16	1	42	1	36	3	27
Plating and electrotyping.....	2	1	1	16		16	2	16
Decalcomania.....	11	1	6	1	1	1		1
Galvanizing.....		2	3	3		3		3
Phosphorus.....		1	*	*	*	*		
Aniline.....	2	2		1				1
Mercury (fulminate of mercury)								
Total for other poisonings..	50	54	26	116	15	116	19	115
Total for all classes.....	319	106	381	251	211	257	157	250

* Means reports discontinued.

RESULTS OF INSPECTIONS ACCORDING TO THE PROVISIONS OF THE BLOWER LAW.

The high morbidity rate among buffers and polishers prompted the enactment of this law in 1897. The installation of the protective devices required by this law has not only reduced tuberculosis among the members of this trade, but has made a hazardous occupation comparatively safe. The greatest safety factor in this industry is the exhaust system which, if efficient, will carry away all the dust and fine dirt from the grinding, buffing and polishing wheels, thereby creating a wholesome atmosphere to work in.

In following the results of inspections made in polishing and buffing shops the reader will be able better to understand the discussion by reviewing a synopsis of the law, which is as follows:

Section 1 of this law states "that all persons operating any factory where emery wheels or belts of any description are used for polishing,

buffing, or grinding shall provide such machinery with a blower or exhaust system for the protection of the health of employees against the dangerous dusts arising from such wheels or belts. The dust must be carried off either directly to the outside of the building or to some receptacle so as to confine such dust; an exception is made of machinery requiring water at the point of grinding. The law expressly exempts small shops where only one man is employed."

Section 2 of this law explains the methods by which the purpose of the preceding paragraph may be carried out. Every wheel must be provided with a hood so applied to the wheel that the dust will fall into the hood by centrifugal force and then be carried off by the current of air into a suction pipe attached to the hood.

Section 3 provides for a 3-inch suction pipe on every wheel 6 inches in diameter or less; for a 4-inch suction pipe on wheels 6 to 24 inches in diameter; for a 5-inch suction pipe on wheels 24 to 36 inches in diameter. For wheels over 36 inches in diameter the suction pipe must not be less than 6 inches in diameter. The suction pipe from each wheel must be full size to the main trunk suction pipe and the main suction pipe to which smaller pipes are attached shall, in its diameter and capacity, be equal to the combined area of such smaller pipes. The discharge pipe from the exhaust fan connected with such suction pipe shall be as large or larger than the suction pipe.

Section 4 provides that the necessary blowers shall run at a rate of speed producing a velocity of air in such suction pipe of at least nine thousand feet per minute, equivalent to a pressure of air able to raise a column of water not less than 5 inches in a "U" shaped tube. All branch pipes must enter main trunk pipe at an angle of 45 degrees or less; and the main trunk pipe shall be below the emery or buffing wheels and as close to the same as possible, and must be located either upon or beneath the floor. All elbows must have smooth surfaces, having a radius in the throat of not less than two diameters of the pipe on which they are connected.

Section 5 charges the Chief Factory Inspector with the enforcement of this law.

Section 6 provides a penalty for noncompliance with the provisions of this act of not less than \$25 and not exceeding \$100.

Approximately ninety per cent of the shops in Chicago are in good condition, so far as the blower systems are concerned. Some few still operate with the overhead exhaust system, the installation of which this department has made it a point to discourage on the score of inefficiency. The floor system is preferred by this department, and during the past year several firms have adopted this system upon the department's advice, when remodeling their plants or moving into new quarters.

As a result of its inspections the department finds that the main trouble in the case of deficient blower systems is due to the back-pressure in dust collectors. Where this condition exists great danger threatens the workmen, because the back-pressure destroys the usefulness of the entire system by preventing suction. Especially on large and powerful fans, where no provision is made for the escape of the air other than through the ordinary opening in a collector, the back-pressure will counteract the exhaust to such an extent, that the test by the U-shaped

tube will show no pressure, at all. In other words, the fan is doing a useless job, wasting power, and failing to protect the workmen. This back-pressure is caused by the tremendous rate of speed at which the air is exhausted by the fan into the collector. The air enters the collector with greater rapidity than is permissible with the small means of escape. The air brought in by the fan strikes the sides of the collector with such force that it "backs up" into the exhaust pipes, causing the fan to revolve



Figure 31. Polishing room before installation of blower.

without accomplishing anything other than stirring up the air in the pipes. It is just as essential to provide means for getting rid of the air as it is to make it.

To overcome this state of affairs the department advises the installation of a tubular cylinder, which will permit the exhausted air from the fan to rush out of the collector at a rate of speed that will not destroy the suction power of the fan. The tubular cylinder has been installed

in several instances, and is performing satisfactorily. In several shops where the systems were equipped with 50 and 60 inch fans the foremen were puzzled as to the reason of such powerful fans failing to draw even an inch in the U-shaped tube. But when the U-shaped tube was placed in the collector and the test made there it was shown that the pressure was reversed. A working model of a complete exhaust system and wheels on exhibition in our safety museum demonstrates the practicability of the tubular cylinder.

Another objectional feature in polishing and buffing shops, which this department is rapidly doing away with, is the funnel shaped hood.



Figure 32. Same polishing room after installing blower.

This type of a hood does not afford adequate protection and permits much of the fine dust and lint to enter the workroom. The more efficient oval type is recommended by the department, because by the use of this type sufficient suction is permitted on all sides of the wheel to draw off the dangerous elements.

The hazard in polishing is not nearly so great as in buffing. Polishing wheels usually consist of the canvas, bull-neck, felt, or sheepskin type. The wheels are sized, glued, and coated with various grades of emery, depending on the kind of work. The various materials of the

polishing wheels, such as canvas and sheepskin, are heavy and are not apt to float in the air. The danger of the polishing wheel lies in the fine particles of glue and emery, both of which are light enough to remain suspended in the atmosphere, where they are breathed into the lungs of the polishers. But in addition to the glue and emery the polisher is confronted with the danger of having brass, zinc, or other metallic dust enter his respiratory channels. Fine particles of such dusts are due to the abrasive action of the emery on the material being polished.

The buffing wheel, on the other hand, is considered a source of greater danger than the polishing wheel because composed of various



Figure 33. Hoods on blower system.

grades of fine muslin. The rapid wearing or destruction of a buffing wheel causes great quantities of lint to fly off, which if not drawn off by an efficient exhaust enters the lungs of the buffer, who will become a victim of tuberculosis in the vast majority of cases. Another element of danger to the buffer, and one which cannot be guarded against, exists by reason of the buff catching in the work. This is particularly true in cases, when fancy or scroll work is being buffed. If the buffer is not sufficiently expert in handling this class of work, and the buff becomes tangled in the metal parts, the operator will receive serious injuries to his hands, face, or body.

The so-called brass or satin finish involves practically no danger. This is a wet process. The wheels consist of brushes and are run very slowly, generally not to exceed 600 revolutions per minute.

The various methods whereby the efficiency of exhaust systems may be tested need not be repeated here, as they are presented in detail on page 239 of the Twenty-first Annual Report of this department.

The law exempts such shops from compliance with this law which do not employ more than one man. Inspections have shown that this exemption is detrimental. Many shops doing polishing and buffing presumably employ only one man. Instances have been discovered, where the evidence showed that the amount of work done, must have been performed by more than one man. Usually a stand has a polishing and a buffing wheel, so that two men can work at the same time on different classes of work. It is a simple matter to have one of the men retire, while the inspector is in the office of the proprietor.

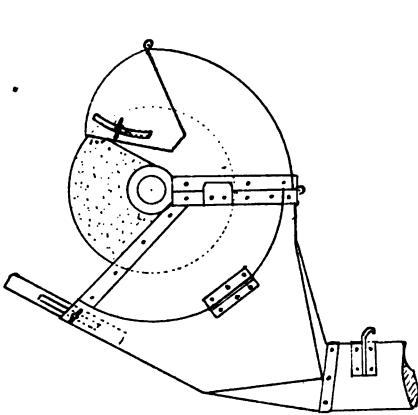


Figure 34. Approved type of metal polisher's hood. Note movable apron on top of hood, operated by thumb screw. This hood will accommodate a 16 inch wheel.

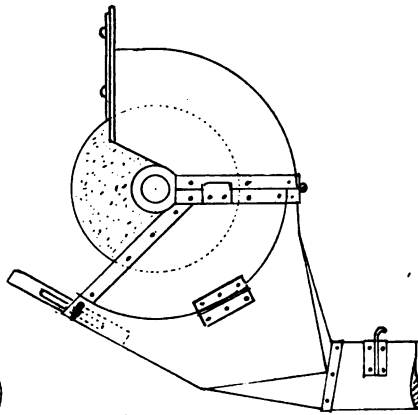


Figure 35. This hood, while good in other respects, is poorly designed at top. The slide is not as efficient as the movable apron in Figure 31, because it does not catch the fine dust at the top of the wheel.

The law should be amended to include also the one-stand shop, because without an exhaust system not only the operator of the wheel, but other employees in the same workroom are compelled to breathe the dust and lint laden air.

Table No. 1 offers a concrete review of the inspection work under this law. In the course of the year 1,075 inspections were made in 329 establishments located in Cook County and 10 inspections took place in 3 towns outside of Cook County, making a total of 1,104 inspections in 339 establishments for the entire State. The table further shows the number of establishments divided into ten industries according to the nature of business. Two thousand and twenty-eight men and 20 women were employed in the 329 factories located in Cook County. The ten establishments located in cities outside of Cook County employed 1,058 men and 16 women. The total number of employees engaged in polishing, buffing and grinding in the 329 factories throughout the State being 3,122.

The hours of employment in the various factories doing this class of work are of interest. By far the majority of establishments adhere to the nine hour day; of the 326 workshops located in Cook County 284 worked nine hours per day; 34 worked nine and a half hours per day; 6 worked ten hours per day; and 3 worked 8 hours per day. In the 10 plants outside of Cook County all worked 10 hours a day. For the entire State the table shows that three establishments work an 8 hour day; 2 an 8½ hour day; 284 a 9 hour day; 34 a 9½ hour day; 1 a 9¾ hour day, and 16 a 10 hour day.

In the 339 establishments 3,767 wheels were reported on, of which 3,689 were provided with proper protection leaving 78 without adequate protection. In Cook County 329 factories had 3,578 wheels of which 66 were unprotected, while in 10 plants located outside of Cook County 189 wheels are reported of which 12 were unprotected.

A total of 294 orders were issued to remedy defective systems or to install a system where none was being used; 86 orders called for increase of velocity; 71 orders for the improvement of present systems; 34 for installation of new exhaust systems; 70 orders for adequate hoods; 11 for change in angle of branch pipes and 30 orders for repairing defective pipes and cleaning same. Of the 292 orders issued 260 affected factories in Cook County, the remaining 32 orders applied to such establishments as were located in towns outside of Cook County.

TABLE 1—RESULTS OF INSPECTION ACCORDING TO THE BLOWER LAW.
Entire State of Illinois, July 1, 1915, to June 30, 1916.

Location of establishments in—	Number of establishments.	Number of inspections.	Industries.										Number of employees.		
			Job shops.	Stoves.	Tools and implements.	Beds.	Fixtures.	Cutlery and hardware.	Novelities.	Machinery and foundry.	Jewelry.	Miscellaneous.	Total.	Men.	Women.
Chicago and Cook County.....	*329	1,075	42	3	22	3	74	81	4	56	2	42	2,048	2,028	20
Cities outside of Cook County.....	10	29	1	1	1	1	1	3	1	6	1	1	1,074	1,058	16
Total entire State	339	1,104	43	4	23	4	75	84	5	62	3	43	3,122	3,086	36

* Includes 12 shops having one stand.

TABLE NO. 1—Concluded.

Location of establishments in—	Number of establishments having the following hours of employment.					Number of wheels.			Orders issued.							
	8	8½	9	9½	10	Total.	Protected.	Unprotected.	Total.	Increase velocity.	Improved equipment.	Install system.	Provide hoods.	Changeable angle branch pipes.	Repair and clean pipes.	
Chicago and Cook County.....	3	2	284	34	6	3,578	3,512	66	260	75	63	31	66	7	18	
Cities outside of Cook County.....	1	1	1	1	10	189	177	12	32	11	8	3	4	4	12	
Total entire State	4	3	285	35	16	3,767	3,689	78	292	86	71	34	70	11	30	

Table No. 2 covers establishments located in Chicago and Cook County arranged in ten industrial groups. It will be noted that fixture factories, hardware and supplies manufacturers, and machine shops and foundries employ the largest number of men. Job shops rank next in number as well as in number of employees. These four industrial groups contained all the unprotected wheels, and over four-fifths of the corrective orders issued being confined to them.

TABLE NO. 2—RESULTS OF INSPECTIONS ACCORDING TO THE BLOWER LAW.

Chicago and Cook County, July 1, 1915, to June 30, 1916.

Industry.	Number of establishments.	Number of inspections.	Number of employees.			Hours of employment.					
			Total.	Men.	Women.	8	8½	9	9½	10	
Job shop.....	42	212	245	241	4	1	2	35	4	.....
Stoves.....	3	8	38	38	.....	.....	.....	2	1	.....
Tools and implements.....	22	39	251	251	.....	1	.....	15	6	.....
Beds.....	3	12	9	9	.....	.....	.....	3	.....	.....
Fixtures.....	74	241	425	411	14	.....	.....	60	14	.....
Cutlery and hardware.....	81	263	495	493	2	.....	.....	78	3	.....
Novelties.....	4	11	21	21	.....	.....	.....	3	1	.....
Machinery and foundry.....	56	214	426	426	.....	1	.....	54	1	.....
Jewelry.....	2	2	22	22	.....	.....	.....	2	.....	.....
Miscellaneous.....	42	73	116	116	.....	.....	.....	32	4	6	
Total.....	329	1,075	2,048	2,028	20	3	2	284	34	6	

TABLE NO. 2—Concluded.

Industry.	Number of wheels.			Orders issued.							
	Total.	Protected.	Unprotected.	Total.	Increase velocity.	Improve equipment.	Install system.	Provide hoods.	Change angle of branch.	Repair and clean pipes.	
Job shop.....	408	392	16	60	15	14	4	16	3	.....
Stoves.....	46	46	.....	7	4	3	.....	.....	.....	.....
Tools and implements.....	368	364	4	8	2	.....	2	4	.....	.....
Beds.....	20	20	.....	1	1	.....	.....	.....	.....	.....
Fixtures.....	736	722	14	42	10	14	4	14	.....	.....
Cutlery and hardware.....	826	814	12	48	18	12	6	12	.....	.....
Novelties.....	42	42	.....	1	.....	.....	1	.....	.....	.....
Machinery and foundry.....	864	856	8	35	9	8	8	8	.....	2	
Jewelry.....	44	44	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous.....	224	212	12	58	16	12	6	12	4	8	
Total.....	3,578	3,512	66	280	75	63	31	66	7	18	

Table No. 3 shows the records of inspections classified according to cities outside of Chicago and Cook County. In Aurora two inspections of a like number of shops were made. In North Chicago four establishments received 13 inspections and four Waukegan shops were inspected 14 times. The conditions in shops in North Chicago and Waukegan were very unsatisfactory and several of the firms had to be

taken to court in order to obtain compliances with the order for new installation or changes.

TABLE NO. 3—RESULTS OF INSPECTIONS ACCORDING TO THE BLOWER LAW.

In cities outside of Cook County, July 1, 1915, to June 30, 1916.

City.	Number of estab- lishments.	Number of inspections.	Industry.								Number of employees.			
			Job shops.	Stoves.	Beds.	Fixtures.	Hardware and supplies.	Novelties.	Machinery.	Jewelry.	Foundry products.	Total.	Men.	Women.
Aurora.....	2	2	.....	1	.....	.....	1	.....	.....	.....	922	907	15
North Chicago.....	4	13	.....	.....	.....	.....	1	.....	1	.....	80	89	.....
Waukegan.....	4	14	.....	.....	.....	.....	1	.....	1	.....	83	82	1
Total.....	10	29	1	3	2	4	1,074	1,058	16

TABLE NO. 3—Concluded.

City.	Hours of employment.				Number of wheels.			Orders issued.						
	9	9½	9¾	10	Total.	Protected.	Unprotected.	Total.	Increase velocity.	Improve equipment.	Install system.	Provide hoods.	Change angle of branch pipe.	Repair and clean pipes.
Aurora.....	2	6	6	.....	5	1	.....	1	.....	.....	1
North Chicago.....	4	103	103	.....	13	4	4	.....	.....	.....	.....
Waukegan.....	4	80	68	12	26	6	4	2	4	2	2
Total.....	10	189	177	12	32	11	8	3	4	4	12

Table No. 4 shows the nature of work done in the various establishments visited. Three hundred and one factories located in Chicago and Cook County were reported as doing polishing, and buffing and 48 grinding. In plants outside of Chicago and Cook County, 10 did polishing and buffing, 4 grinding; it will be noticed that most of the establishments confine themselves to polishing and buffing, only about one-sixth of the factories do grinding. The condition of blowers in most of the shops was good; of the 329 factories in Chicago and Cook County, only 31 were reported as having blowers in poor condition, while the blowers of almost 75 per cent of the shops outside of Cook County were found to be in bad condition.

In Chicago and Cook County blowers were located below the wheels in 311 factories, 18 being reported as having their blowers constructed above the wheels. In all shops outside of Cook County the blowers were placed below the wheels.

The test for adequate pressure according to the "U" shaped tube failed in 29 of the factories in Cook County. In over 75 per cent of the

factories outside of Cook County the test showed that the required amount of air per minute was below the legal standard.

In most of the establishments the dust was disposed of through collector systems. In Chicago and Cook County, 18 shops disposed of the dust in a free state and 12 through flues. In shops outside of Chicago and Cook County dust was disposed of through the collector system. With the exception of 68 shops in Chicago all the factories were equipped with oval hoods; the 68 shops mentioned used the funnel-shaped hoods.

In only 18 establishments out of the 329 inspected in Chicago were the pipes found in bad condition. In 5 shops out of a total of 10 located outside of Cook County pipes were reported as being below standard.

The location of workroom in which polishing, buffing and grinding is done becomes of the utmost importance, when the health of the employees is taken into consideration. Men doing this kind of work require an abundance of fresh air, good ventilation and plenty of light. This condition is seldom obtained in basement shops; they have shown themselves to be vicious places of employment; for this reason the Forty-ninth General Assembly passed a law prohibiting the use of basements for this kind of work. The enforcement of this law has been placed in the hands of the Chief Factory Inspector and is discussed separately.

Most of the workrooms were reported as being located on or above the first floor; 14 shops in Chicago were found to be located in the basement. The majority of the factories in Cook County were located on or above the third floor, while 124 shops occupied the ground floor and 44 the second floor. In cities outside of Cook County all shops were on the ground floor.

In every factory visited, electricity was employed as the motive power, none being reported as using steam. Only 9 of the shops in Chicago used direct current, the indirect current being used almost exclusively.

TABLE NO. 4—ANALYSIS OF REPORT OF INSPECTIONS ACCORDING TO THE BLOWER LAW.

State of Illinois, July 1, 1915, to June 30, 1916.

Location of establishments.	Number of establishments doing—			Establishments in which condition of blower was—		Number of establishments in which blower is located.		Number of establishments in which pressure test in U tube was—		Number of establishments disposing of dust through following systems—		
	Polishing.	Buffing.	Grinding.	Good.	Bad.	Above wheel.	Below wheel.	Below five inches.	Five inches or over.	Collector.	Free.	Flue.
Chicago and Cook County.	301	301	48	298	31	18	311	29	300	299	18	12
Aurora.....	2	2	12	1	3		2	2		2		
North Chicago.....	4	4	1	12	12		4	3	1	4		
Waukegan.....	4	4	1	1	3		4	3	1	4		
Total.....	311	311	52	302	39	18	321	37	302	309	18	12

TABLE NO. 4—Concluded.

Location of establishments.	Kind of hoods.		Number of establishments in which condition of pipes was—		Location of department.				Kind of motive power.		
	Oval.	Funnel.	Good.	Bad.	Basement.	First floor.	Second floor.	Third floor and above.	Steam.	Electricity.	
										Direct current.	Indirect current.
Chicago and Cook County.	1,688	68	311	18	14	124	44	147	.....	9	320
Aurora.....	12	.....	1	1	.....	2	.....	.....	.....	.....	2
North Chicago.....	206	.....	2	2	.....	4	.....	.....	.....	.....	4
Waukegan.....	180	.....	2	2	.....	4	.....	.....	.....	.....	4
Total.....	2,066	68	316	23	14	134	44	147	.....	9	330

BASEMENT LAW.

This law provides that all shops, such as metal polishing, grinding, plating and dipping, which produce poisonous or noxious fumes and dusts must be located wholly above the surface of the ground.

Fourteen basement shops were found and an order was issued in each instance for their removal. These fourteen shops employed 29 men. At this writing eight of the shops have removed to new quarters and in each of these a new blower equipment has been installed of the latest and most efficient type.

RESULTS OF INSPECTIONS ACCORDING TO THE PROVISIONS OF THE STRUCTURAL SAFETY LAW.

The State statute providing for safe working conditions in the building trades both to workmen as well as pedestrians became effective on July 1, 1907 and is commonly termed the "Structural Safety Law." Its official title states, that it provides for the protection and safety of persons in and about the construction, repairing, alteration, or removal of buildings, bridges, viaducts, and other structures.

Section 1 of the law provides that scaffolds, hoists, stays, ladders, supports or other mechanical contrivances used in the erection, repairing, altering, removal or painting of any house, building, bridge, viaduct or other structure must be erected in such manner as to afford complete protection to the life and limb of any person engaged in any class of work thereon, or passing under same and to prevent material from falling; scaffolding more than twenty feet from the ground must be provided with a safety rail at least thirty-four inches above the floor and extending along the entire length of the outside ends, and such scaffolds must be fastened to the building to prevent swaying.

Section 2 states that if any building in process of erection where the distance between the enclosing walls is more than twenty-four feet, in the clear, there shall be maintained proper intermediate supports for the joists, which supports shall be either brick walls, or iron or steel columns, beams, trusses or girders, and the floors in such building shall be

designed in such manner as to be capable of bearing in all their parts in addition to the weight of the floor construction, partitions and permanent fixtures, and mechanisms that may be set up upon the same, a live load of fifty pounds for every square foot of surface.

Section 3 makes it obligatory upon the owners of the building to post a placard on each floor stating the load per square foot of floor surface which may with safety be applied to that particular floor during such construction, or if the strength of the different parts of any floor varies, then there shall be such placards for such varying part of such floor. To load any floors or parts thereof to a greater extent than the load indicated on such placards is unlawful. All placards must be approved by the local building inspector, or the State Factory Inspector.

Section 4 charges the State Factory Inspector with the duty of inspecting all scaffolding and the slings, hangers, blocks, pulleys, stays, braces, ladders, irons or ropes used in the construction, alteration, repairing, cleaning or painting of buildings to ascertain whether they are unsafe and liable to prove dangerous to the life and limb of any person. If, upon examination, scaffolds or any of the parts are found dangerous, the State Factory Inspector shall at once notify the responsible party of such fact, and prohibit the use thereof and require the same to be put in a safe condition. Such notice may be served personally or by placard affixed to the defective part; after such notice has been so served or posted the responsible party shall cease making use of any dangerous apparatus so designated.

The State Factory Inspector has free access to any building.

All swinging or stationery scaffolds or platforms must be able to bear four times the maximum weight required to be placed thereon and shall not be overloaded.

Section 5 directs that any person hiring another in the erecting, repairing, altering or painting of any water pipe, standpipe, tank, smoke-stack, chimney, tower, steeple, pole, staff, dome or cupola, shall keep at all times safe scaffolds not less than sixteen feet below point of work, particularly when such work is being performed at a height of thirty-two feet, for the purpose of preventing the workmen from falling in case of any accident.

Section 6 makes it incumbent upon contractors, where the plans require the floors to be arched between the beams, to complete the flooring as the building progresses to not less than within three tiers below that on which the iron work is being erected. If the plans do not require filling in between the beams, all contractors for the carpenter work in course of construction shall lay a safe temporary floor on each story as the building progresses, to not less than within two stories below the one to which such building has been erected. Where double floors are not to be used, the contractor shall keep plank over the floor two stories below where the work is being performed. If the floor beams are of iron or steel the contractor for the iron or steel work shall thoroughly plank over the entire tier of beams, except spaces for raising materials or for stairways and elevator shafts.

Section 7 demands that contractors enclose all openings in floors where hoisting apparatus is used on all sides by a substantial barrier at least eight feet in height. If practical, all hoisting machines must be

set on the ground, or if placed on one of the floors above, must be properly supported with a foundation capable of safely sustaining twice the weight of such machine. Where buildings are over five stories high no material is permitted to be hoisted over a public highway, unless such street be barricaded.

If hoisting machines are used, a complete system of communication by means of signals shall be provided, in order that prompt communication may be had at all times, between operator of engine and the employees engaged on the job.

The penalty clause provides upon conviction for a fine of from twenty-five (\$25) to five hundred dollars (\$500), or imprisonment of from three (3) months to two (2) years, or both fine and imprisonment.

The protection offered to the thousands of workmen in the various branches of the building trades by this law is absolutely necessary.

Without exception the group of occupations in the building trades, especially when engaged in the erection of the modern steel and concrete skyscraper, is more dangerous than any other occupations under the jurisdiction of this department. Accidents may be looked for and consequently must be guarded against, from the digging of the first caisson well until the last man has completed his work and left the buildings.

The observing pedestrians, especially those dodging in and around construction work in the loop district of Chicago, are well aware of the army of workmen busily engaged on all parts of a modern skyscraper several being in course of construction at the same time. As rapidly as progress is made one brigade of workmen follows the other, until the entire structure resembles a human beehive, full of energy and vigor. The first on a job are the well-diggers, and those engaged in the construction of the permanent foundation work. As soon as the concrete piers have set the bridgemen are set to work raising the iron. After the erection of the lower floors carpenters arrive followed by masons, bricklayers, plasterers, electricians, steam fitters, plumbers, painters and others. It is safe to say that on large structures, more especially office buildings, the number of men employed passes the thousand mark. The rush and constant hustle on the part of these hundreds of workmen is often encouraged and accentuated by reason of the bonus system, whereby contractors receive a certain additional stipend in recognition of the completion of a building in advance of schedule time. When a contractor assumes the erection of a building under such an agreement, it generally contains a clause, which specifies that the contractor is liable to a stipulated sum or fine for each day that he exceeds the contracted time or that the building is untenable.

Considered from a viewpoint of safety this extra pressure or rush invites accidents. The situations of the bridgemen and others are hazardous enough without being made more so by the fact that they are compelled to exert a greater than normal amount of quickness. The toll of life in the building trades has been great in the past, and it is regrettable to state that even at this time the list of injured and killed is larger than one would expect, in view of the many excellent safety devices on the market and the orders from this department.

The science of building modern bridges, piers, office buildings and other structures has developed so rapidly during the past ten years and

the law has remained unchanged, so that we find ourselves in the peculiar situation of trying to make an old law meet new conditions. In other words, the lawmakers have not kept pace with the rapid strides taken by the building trades, and therefore have failed to modernize the present law with protectionary amendments to further safeguard dangerous conditions arising in the field of structural activities.

During the Forty-ninth General Assembly a bill was introduced in the House to amend the present Structural Safety Law, not with the intention of replacing it, but rather to strengthen it. The following items have suggested themselves to this department and should be considered when any change of the present law is contemplated.

Section 1 of the present law should include: "On all stacks 10 feet or more in height and all tanks, supports, chimneys, towers and steeples where work is being done from the inside, that three sets of scaffolds shall be used." The necessity for this amendment became apparent to the Department of Factory Inspection and the Building Commissioner on account of the numerous accidents due to the breaking of scaffolds. The additional expense to which the contractor is subjected is very small. It simply requires a few additional planks.

Another amendment to section 1 should provide that when material is being hoisted on the inside of enclosed chimneys, towers, steeples and enclosed shaftways, the buckets, boxes, tubs or any other receptacles shall be provided with guides, and be securely covered to prevent tools, bricks or other material from falling out of same. This amendment is suggested owing to the numerous accidents occurring as a result of material falling out of buckets and receptacles used in hoisting.

Section 3a. The next suggestion inserts a new section known as 3a in the present law, which in substance provides that during the construction of all buildings which will be eight stories or more in height, an elevator must be furnished and operated for bringing the workmen to and from their work. The necessity for such a provision is apparent, when a study is made of the accidents occurring in the construction of the mammoth skyscrapers, particularly in the city of Chicago. The great majority of these accidents are caused by reason of the workmen becoming fatigued in climbing to the 10th, 15th and 20th stories of these skyscrapers.

When a workman is fatigued he has lost control over his actions, his brain is more or less deadened, resulting in careless moves that endanger his life, and the lives of his fellow-workers and the pedestrians on the street. At the present time, building trades workers must climb stairways and ladders to the highest point of the building, to begin work in the morning and to leave at noon, returning again at noon and leaving work at night and often extra trips for material, or to answer the call of nature are necessary. Material elevators are operated in these buildings under construction. In the majority of cases the contractor rents them from the elevator concerns at a certain sum per day. The installation of an elevator to carry workmen means, the installation of a more approved type of elevator for these skyscrapers under construction.

Section 5. Section 5 of the present law should be amended by striking out the words "or more" following the words "nor less than 16 feet."

The presence of these words in the law destroys the intent and effect of section 5, therefore, the amendment to eliminate these words.

Section 7. An amendment to section 7 should provide that all shaftways of elevating machines and hoisting apparatus shall be completely enclosed, and protected in such a manner, that no material falling off hoisting machine or elevator can fall outside of the shaftway. This amendment is to protect hoistways so that no falling material or other substances can injure workmen or pedestrians.

A further amendment to this section should provide that material hoists or elevators operated by horse or hand power shall be securely locked when not in operation. This provision is requested in order to insure against interference with such hoisting machines or elevators by children or others entering the building after workmen have left. The cost of compliance with this amendment would be very small. We have records in this department of numerous accidents to children caused under these circumstances. Accidents to children generally happen when they climb to the top of a double platform horse hoist on to the lifted hoist. The weight of several children is sufficient to send the hoist to the ground at terrific speed. There are no rails on these hoists, consequently when the hoist crashes to the ground floor, the children are either thrown off or else try to hold themselves on the hoist track or any projection, resulting in severe injury to the children. On one construction job four little boys were injured. The record states that one boy broke his left leg and right ankle, the other injured his spine and broke his ankle, the third received internal injuries and lacerations of the face, and the fourth broke his ankle and injured his back. This accident happened on a Saturday afternoon after the workmen had left the building. Another accident occurred while a boy was playing with some companions about a hoist. This little fellow was pulling on the cable when the platform started, catching the boy's hands between the sheave and the cable, cutting off two fingers of the left hand. This accident happened after working hours and was due to an improperly protected hoist. These two examples will suffice to indicate the average accident report on children, while playing on or with these dangerous hoists.

(7b) The next amendment showed a provision, that all signal systems or bell cords used in connection with operations of cranes, hoists or derricks shall be so enclosed and guarded that they cannot be interrupted or interfered with. The substance of this provision is now enforced, but the insertion of this specific language is requested for the information of the contractors.

Section 8a. Another amendment suggested is the creation of a new section known as section 8a, which in substance provides that beams or cross beams shall be so attached as to prevent accidents. Sometimes temporary connections are now made by the insertion of one bolt. Very often the iron tilts when a worker is passing over it. The effect of this provision would be to make necessary the insertion of two bolts. Two bolts would hold the beam absolutely secure and to permit a man to walk on it without being tilted over.

Section 8b. Another provision to be known as 8b is suggested in order to provide safety scaffolds not more than 16 feet from the scaffold or other support on which the workmen are employed.

Section 8c. Another section to be known as section 8c provides for toilet facilities on every fifth floor. This request is of utmost importance considering the workmen's health, because the absence of toilet facilities very often cause workers to neglect the call of nature, resulting in constipation and other serious irregularities. The principles of sanitation also demand toilet arrangements during the construction of high buildings. Under present working conditions the workmen are compelled either to climb down from whatever height the structure has reached, the tenth, fifteenth, or twentieth floor, as the case may be, or to seek an available place upon the floor where they are working, thus creating an unsanitary condition of the most offensive and obnoxious kind. It would be a difficult matter to provide the water flushed toilet type, first on account of enormous expense, and secondly because the water pressure supplied by the municipality as a rule will not force the water higher than the second or third floor. However, this objection can readily be overcome by the installation of portable incinerators, or chemical toilets, at a small expense. These portable incinerators, or chemical toilets, are sanitary and can be carried from one job to the other without difficulty and plumbing expense.

Section 8d. This section makes provisions for the supply of water for drinking purposes on each floor of a building under construction. The need of drinking water is apparent, when thought is given to the difficulty that attends workmen on buildings three to twenty-five stories in height leaving work in order to procure a cup of water. On account of the difficulty of obtaining a water pressure over two or three stories in height, and the great expense of installing a special well and pump on each construction job, it is suggested that a large water tank after being filled and sealed be hoisted daily to the highest point reached as the building progresses. From this tank supply pipes could be run down to each floor where men are at work.

Section 8e. Another new provision to be known as section 8e should prohibit the use of gasoline in caissons and tunnel work. Gasoline is a dangerous element. There is no necessity for the use of gasoline in this work and its storage in or about tunnel work increases the hazard.

Section 9. An amendment to section 9 of the present law would correct the present penalty clause. If the amendment is adopted, it will clear up the jurisdiction questions that are sometimes raised in these cases.

General. In the main the above amendments correct technical flaws of the present law and add some new provisions that are absolutely essential for the safety and protection of human life and health in the building industry. Many contractors now voluntarily make such provisions as have been embodied in the above suggestions and it is only equitable that such provisions should be in the law in order that the humane contractor may not be at a disadvantage in bidding on work.

WELL DIGGING DANGERS.

In our previous annual report the dangers in well digging and foundation work of buildings, bridges, piers, and other structures were fully discussed, and provisions suggested for the elimination of a large

number of accidents, by the adoption of safety devices designed and put in operation by several firms at the instigation of this department. The particular devices to which we have reference are the safety caisson devices.

In sinking the wells for concrete foundation piers of large buildings in Chicago, a general method is to place over each well a hoist, having a nigger-head for the manila rope of the bucket, and a grooved sheave for a wire driving cable. The cable serves a series of hoists and is operated from a drum with a steam or gasoline engine or electric motor. The method of operation is to wrap the driven cable once around the sheave, which is keyed to the shaft. The operator stands on the nigger-head side of the hoist and takes as many wraps of rope around the nigger-head as are necessary to lift the load.

We called attention last year to the numerous accidents which were due to the slipping of cables or accidental throwing off of the cable from the driving sheave. At that time the solving of this problem engaged the attention of this department, so that during the past year just completed we have had ample opportunity of watching the performance of these new safety caisson devices.

The department has arrived at the conclusion that these devices are fulfilling their mission with satisfaction, and that they have played an important part in the reduction of accidents from this source.

The excellent safety work carried on during the past two years in the interest of the structural workers and others in the building trades has received an added impetus during the year just completed. Ever on the look-out to increase the safe working conditions of the building trades workmen, this department sent to contractors orders for the installation of safety nets, for the laying of temporary floors on steel structures, for cornish runways in connection with swinging scaffolds and specifications for the proper construction of painters' and tuck pointers' scaffolds. These orders will be discussed in the following paragraphs.

SAFETY NETS.

According to section 5 of the "Structural Safety Law" it becomes necessary to provide suitable means of protection for all those men engaged in the erection of modern steel and iron structures. These means of protection vary according to the particular class of work engaged in. On skyscrapers, for instance, safe and proper scaffold, stay, supports or other suitable devices, must be installed at a point not more than 16 feet below the place, where the men are at work.

But in many instances the department has found that orders calling for temporary scaffolds were impracticable and involved unnecessary expense, as for instance, in the erection of high viaducts, bridges, high arch-trusses, as used on armory buildings, railroad train-sheds, convention halls, domes and cupolas. For that reason the department after much study and investigation has decided, that by the use of safety nets the men will have secured better protection than by wooden planking. The safety nets are similar in character to those employed for the protection of circus performers. They are inexpensive, easily adjusted and removed, and readily transported from one job to the other.



Recreation Building and Shelter House.
City Pier No.2, erected by Morava Construction Co., Chicago, Ill.

.....
This photograph shows method of complying with Section 5 of "Structural Law." Note safety rope netting stretched below trusses to prevent injuries to men due to falls on account of slipping or being pushed. This netting consists of best 5/8" Manilla Rope with 3/4" border. Meshes 6" square. This picture shows removal of safety rope netting upon completion of steel erection and painting.

Figure 33.

These safety nets are suspended beneath points where the men are working. Steel-wire netting was not satisfactory, but rope netting was found to fill the want. The nets are 20 by 40 feet and consist of $\frac{5}{8}$ -inch manila rope, with $\frac{3}{4}$ -inch border. The mesh is 6 by 6 inches. The borders are fitted with loops so that the nets can be readily attached to various points and shifted from place to place. When the job is completed the nets are rolled up for storage or shipment.

The arrangement of the net is shown in the accompanying photograph.

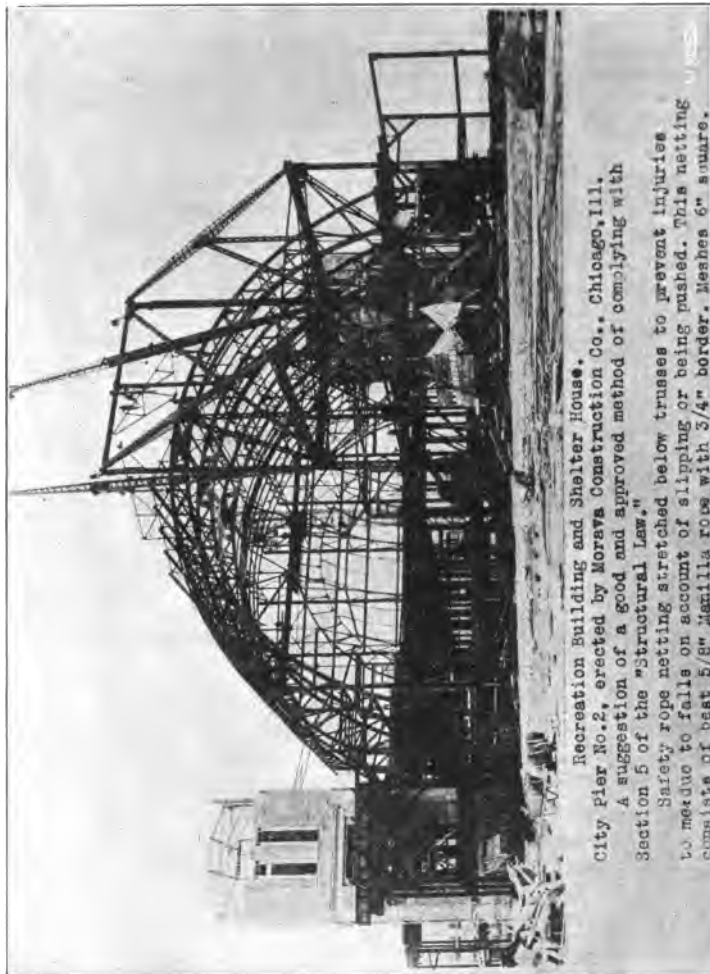


Figure 37.

That these safety nets are practicable is substantiated by the fact, that they have been put to the test and passed it with credit. We have the record of a case, where through the use of these nets two serious accidents, which would undoubtedly have resulted in the loss of two lives, were avoided. Two painters slipped and lost their hold while painting a large steel truss. They fell into the nets without injury to them-

selves. If these nets had not been stretched below the area of work, both men would have fallen a distance of approximately one hundred feet on to a concrete floor.

These nets are made in sections or units, so that any number of them may be tied together forming a solid expanse of rope net work underneath the entire structure.

The department is ordering the use of the safety nets on all classes of structural work, where planking is impracticable. On large building operation where different trades follow each other and the various parts of the work is let out to a number of subcontractors, provisions should be made by the owner, architect or engineer, for the placing of the nets by the first contractor who arrives on the job, and that the nets remain suspended until the structure is completed. The cost could be proportioned among the different subcontractors, as it would save them the trouble of having to take the nets down and stretching their own nets every time a new contractor started or finished his work.

Use of the safety nets should also be made on stacks and for the purpose of protecting riveting gangs. By suspending the nets from outriggers, placed at a distance of ten feet from the edge of the building, riveters will receive the same protection as the other workmen.

This department recommends the adoption of these nets not only to contractors, but also to the various State departments and city building commissions as a practical device. Contractors in Illinois are pleased with them and the workmen claim that they inspire a feeling of security, which enables them to go about their work with greater freedom.

TEMPORARY FLOORING.

Section 6 of the "Structural Safety Law" makes it obligatory for a contractor to plank over an entire floor, upon which work is being performed.

In the construction of the new Chicago freight house of the Pennsylvania lines an unusual condition was brought to the attention of this department in as much as the height of the first two floors was so extraordinary. It is customary during erection, that every other floor is covered with temporary flooring, but in this instance, when the riveting scaffolds were hung on the second floor, it was found that this constituted a violation of section 5 of the "Structural Safety Law," as the men were obliged to work at a height of 43 feet without any protection under them. It, therefore, became necessary to keep the first floor covered with planking in order to keep within the provisions of the law.

The accompanying views show how the temporary flooring was used. It consists of panels of 20 by 22 feet made with 2 by 10 inch planks 16 feet long, laid on 6 by 8 inch joists of straight-grained Norway pine. The joists are 22 feet long, laid on top of the steel beams and spaced 7½ feet apart. Illustration No. 39 shows only a part of the flooring in place, but the law requires the entire area to be covered.

In buildings where the height of the first two stories does not exceed 32 feet, the second floor is the first one to be covered or floored. In the case of the freight station, as mentioned before, the height is 43 feet to the second floor framing (24 and 19 feet for the first and second stories

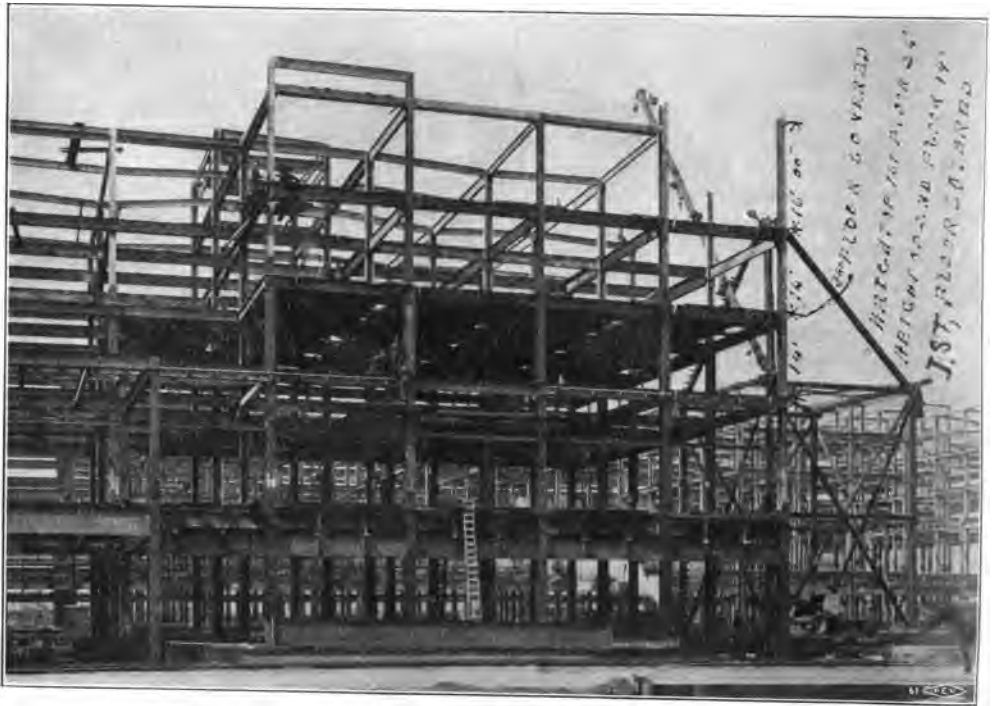


Figure 38.



Figure 39.

respectively), and therefore it was necessary to cover the first floor framing also. This freight depot measures 745 by 420 feet, is four stories high, and contains about 18,000 tons of steel, forming one of the largest operations in the building line ever under the supervision of this department. Owing to constant attention given this job by our office and the use of every known method of safety appliance this structure was completed without any serious accidents.



Figure 40.

CORNISH RUNWAY FOR SWINGING SCAFFOLDS.

The accompanying photograph shows a runway and trolley with a swinging scaffold on one of the buildings in the Union Stock Yards.

The maintenance of large buildings, such as offices, department stores, hotels, etc., involves periodical cleaning, painting and pointing, and also the washing of windows. This work is done usually from



Figure 41.

This building is equipped with a scaffold suspension trolley track hoist just below the cornice. This track consists of an I beam fastened to the wall by brackets and extends about 14 inches from the building.

The object of this track is to provide a safe and convenient means of swinging painters', window washers', tuck pointers', or cleaners' scaffolds.

Swinging scaffolds suspended from this trolley hoist may be operated up or down, back or forward.

The advantages of this track are: (1) Savings in time and expense of erecting and moving timbers and hooks from which scaffolds are swung. (2) Lessening of accidents and securing of safer working conditions.

The expense of installation of this safety trolley suspension track will pay itself out of the savings of maintenance expenses in a short time.

swinging scaffolds suspended from thrust-outs or timbers on the roof. Where these supports are of a temporary character, they involve expense, delay and trouble in rigging.

The department recommends the use of an I-beam supported by brackets from the frame or walls of a factory, store, or office building, on all buildings over three stories in height. These trolley tracks for swing-



Figure 42.

ing scaffolds will increase greatly the safety of painters, window washers, tuck pointers, and others, reducing correspondingly the liability risks.

It is an easy matter to provide for these tracks on contemplated buildings, as they can readily be included in the architectural drawings, so that their installation takes place at the same time when the building is erected.

There is still another method of construction of a permanent runway along the cornice, upon which the trolley travels from which the scaffold rigging is suspended.

In this method the runway is an angle $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{3}{8}$ -inches attached to the outer ends of T-bars that are spaced 5 feet apart and have their inner ends anchored to the steel framing of the building. The trolley is composed of steel bars carrying a pair of $4\frac{1}{2}$ -inch grooved wheels. To the lower ends of the bars is riveted a plate for the attachment of the scaffold rigging. The inner end of the trolley frame is bent to engage a 1 by 1 inch guard angle, so that the trolley cannot be pulled off. This device is designed to carry a test load of 1,000 pounds at any point.

On another building in Chicago both the fixed and movable supports for the scaffolds are in use. For the former there is a 3 by 4-inch runway angle carried by cantilevers of 5 inch I-beams attached when required to the steel frame of the cornice and roof. For the movable supports, on a newer portion of the building, there is behind the cornice a track on which travel carriages having cantilever beams that project over and beyond the cornice. The cantilevers form attachments for the scaffold rigging. The carriage is composed of two A-frames, connected by bracing and carrying the cantilever beam. The forward frame has grooved rollers running on a 20 pound rail, while the rear frame has two pairs of 3 inch rollers riding under the flanges of a 10 inch I-beam and so forming the anchorage.

PAINTERS' AND TUCK POINTERS' SAFETY SCAFFOLDS.

Pursuant to the recommendation of the coroner's jury in the case of one Thomas J. Sharkey, 7317 Langley Avenue, who came to his death by falling from a scaffold, the Building Commissioner of Chicago, Charles Bostrom, and the Chief State Factory Inspector, Oscar F. Nelson, met in the offices of the Building Commissioner and discussed means of preventing this and similar classes of accidents. Others attending this meeting were Mr. Robert Knight, Deputy Commissioner of Buildings of Chicago, Mr. John J. Walt, State Deputy Factory Inspector, representatives of the Employing Painters' Association, the Painters' and Decorators' Union, and the Tuck Pointers' and Cleaners' Union.

As a result of this conference the appended rules were formulated and mutually agreed upon as offering means of proper and adequate protection to the life and limb of any person or persons employed on swinging scaffolds, according to the requirements contained in section 1 of the State law: "Providing for the protection and safety of persons in and about the construction, repairing, alteration or removal of buildings, bridges, viaducts and other structures, and the enforcement thereof, as approved June 3, 1907, and in force July 1, 1907."

The State Factory Inspection Department and the City of Chicago Building Department therefore issued the following official orders on January 1, 1916:

The use of all rope, other than wire rope, for slings and stirrups on swinging scaffolds is hereby prohibited.

Bales or stirrups for painters' scaffolds may consist of either wire rope or cable with wooden putlocks, according to the following specifica-

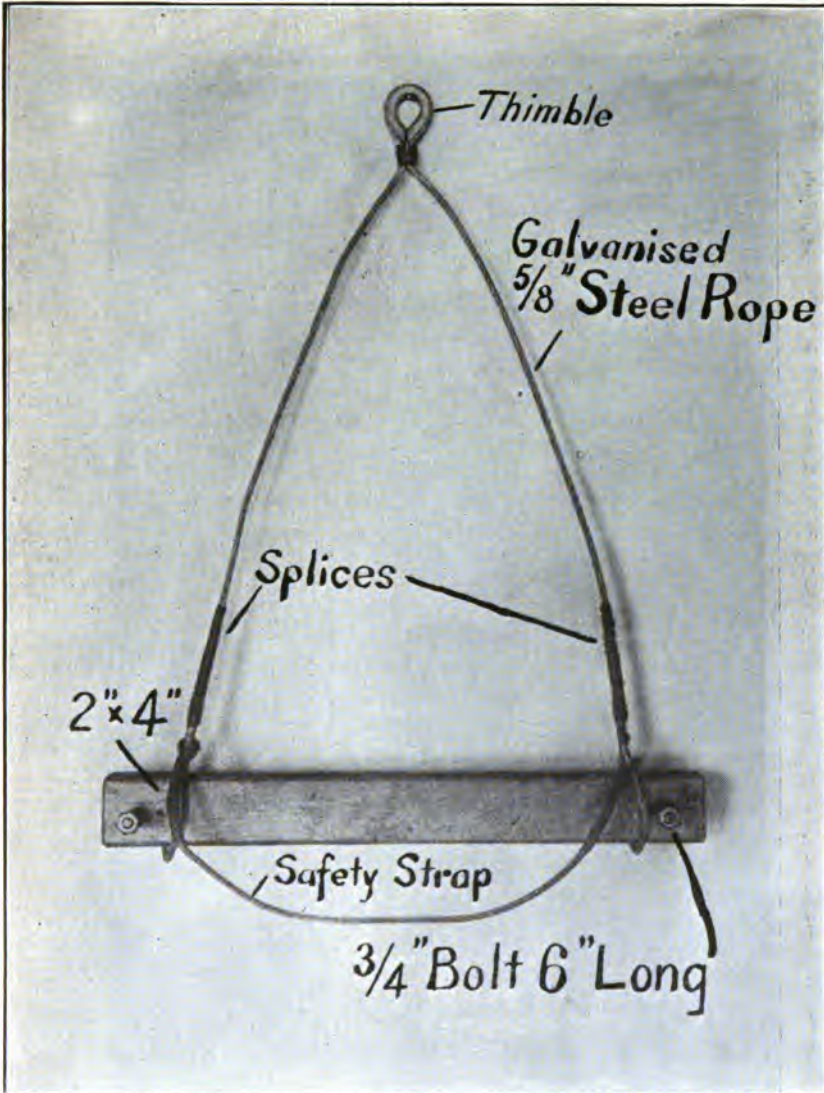


Figure 43.

tions, or with what is known as "iron bales," according to specifications hereinafter contained and as required for tuck pointers and cleaners.

All bales, stirrups or slings must be made of 5/8-inch galvanized cast steel compound running rope (cable) composed of six strands of twelve

wires each. Loops and stirrups for the use of bolsters must be spliced. An additional safety cable must be placed below platform and spliced into both loop, stirrup, bale or sling.

All putlocks and bolsters shall be not less than 2 inches wide and 4 inches deep, of first quality selected straight grained seasoned hickory or white oak. .



Figure 44.

An iron or steel bolt 6 inches long and $\frac{3}{4}$ -inch in diameter shall be fastened through the putlock or bolster at right angles to same not nearer than 3 inches to the end and half way between the upper and lower sides.

An iron washer $1\frac{1}{2}$ inches in diameter and not less than $\frac{3}{16}$ -inch thick shall be applied directly to the sides of the bolster or putlock, the bolt passing through washers. Around bolt between washers and the head of bolt on one side and the nut on the other side, there shall be a sleeve of $\frac{3}{4}$ -inch pipe 2 inches long, the entire arrangement to effect a

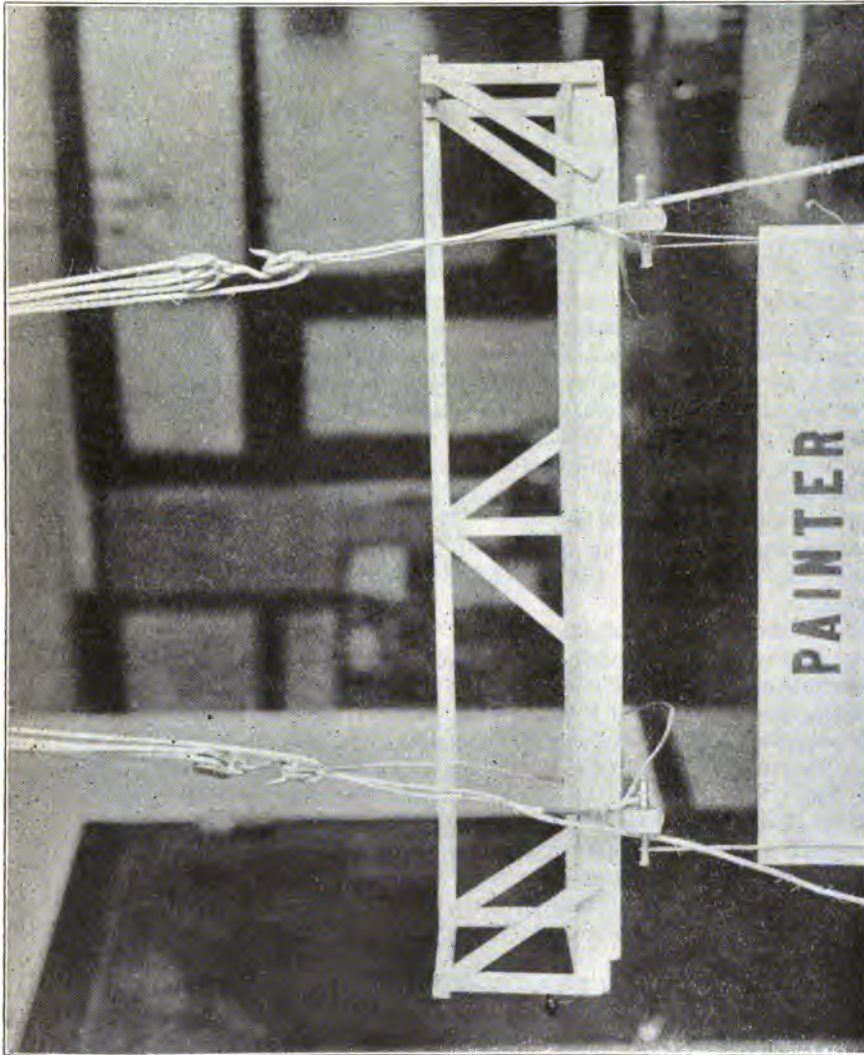


Figure 45.

device to prevent the bale or sling from accidentally slipping over the end of the bolster. After washers, sleeves and nut are properly placed and adjusted, the end of bolt shall be battered or riveted to prevent removing the nut. Bales or slings shall be made of not less than $\frac{5}{8}$ -inch wire cable with spliced loop at each end.

The use of rope or cables of any material whatever for tuck pointers 'and cleaners' swinging scaffolds is hereby prohibited. Solid bales composed of round or square steel not less than $\frac{3}{4}$ -inch in diameter forged or welded in one piece must be used. A clevis of iron or steel must be fastened around the bale of one of the cross pieces of the scaffold in such manner, as to prevent the bale from slipping over the end of the scaffold. Braces must not be nailed or screwed to scaffold, but, if used, must be fastened by a hook bolt and no part of the scaffold must be bored or cut into in order to attach same. (See following section of the law.)

Section 4. Whenever it shall come to the notice of the State Factory Inspector, or the local authority in any city, town or village in this State, charged with the duty of enforcing the building laws, that the scaffolding or the slings, hangers, blocks, pulleys, stays, braces, ladders, irons or ropes of any swinging or stationary scaffolding, platform or other similar device, used in the construction, alteration, repairing, removing, cleaning or painting of buildings, bridges or viaducts within this State are unsafe or liable to prove dangerous to the life or limb of any person the State Factory Inspector, or such local authority or authorities shall immediately cause an inspection to be made of such scaffolding, platform or device, or the slings, hangers, blocks, pulleys, stays, braces, ladders, iron or other parts connected therewith. If after examination, such scaffolding, platform or device of any of such parts, is found to be dangerous to the life or limb of any person, the State Factory Inspector, or such local authority shall at once notify the person responsible for its erection or maintenance of such fact, and warn him against the use, maintenance or operation thereof, and prohibit the use thereof, and require the same to be altered and reconstructed so as to avoid such danger.

Section 9. Any owner, contractor, subcontractor, foreman or other person, having charge of the erection, construction, repairing, alteration, removal, or painting of any building, bridge, viaduct or other structure within the provisions of this act, shall comply with all the terms thereof and any such owner, contractor, subcontractor, foreman or other person, violating any of the provisions of this act shall upon conviction thereof be fined not less than twenty-five (\$25) dollars, or more than five hundred (\$500) dollars or imprisoned for not less than three (3) months or more than two (2) years, or both fined and imprisoned in the discretion of the court.

The observance of this order will avoid most accidents, such as have happened in connection with the use of swinging scaffolds for various purposes.

TOOLS AND MATERIALS FALLING FROM SCAFFOLDS.

In the latter part of October a peculiar accident happened on one of our large buildings in Chicago. Scaffolds were stationed at the 19th story of this building for the use of cleaners, who were starting to wash down the exterior of the building. Several buckets filled with powerful acid solutions dropped from one of the scaffolds injuring three pedestrians and sprinkling many others with the acid, which burned the skin on their hands and faces and ruined their clothing.

After this accident contractors were notified to protect all scaffolds with a wire mesh, similar to toe-board guards around platforms, to prevent buckets from falling.

It is suggested that in the downtown district of Chicago, where it would inconvenience the public to bar off the sidewalk, that temporary canopies be constructed, where such work as washing a building is being done. This canopy could be constructed of either 4 by 4 inch or 4 by 6 inch posts and a 4 by 6 inch cross piece on top, placed about 10 feet apart and covered by 2 inch planks. This temporary canopy could be made to be bolted together and thus removed from one job to another.

A canopy of this description would effectively protect people passing a building, where on account of the cleaning work brushes or buckets with their contents might fall down causing injury and much damage.

REINFORCED CONCRETE CONSTRUCTION FORMS.

Due to the many serious accidents that have happened in connection with reinforced concrete building construction, this department by reason of the authority vested in it under section 1 of the "Structural Safety Law" suggests certain methods, which are explained in detail below, to contractors and builders for the safety of workmen and pedestrians.

The section of the law referred to follows:

"Section 1. Be it enacted by the People of the State of Illinois, represented in the General Assembly: That all scaffolds, hoists, cranes, stays, ladders, *supports*, or other mechanical contrivances, erected or constructed by any person, firm or corporation, in this State, for the use in the erection, repairing, alteration, removal or painting of any house, building, bridge, viaduct, or *other structure*, shall be erected and constructed in a safe, suitable and proper manner, and shall be so erected and constructed, placed and operated, as to give proper and adequate protection to the life and limb of any person or persons employed or engaged thereon, or passing under or by the same, and in such manner as to prevent the falling of any material that may be used or deposited thereon.

Numerous accidents, where one, two, and three men have been killed, and others seriously injured, were investigated by this department during the last year. In addition to these accidents many complaints from men engaged in this class of building construction, who considered their lives endangered by faulty building methods, were investigated. In almost every case the department issued orders to contractors for additional reinforcements under concrete forms by the use of stronger posts and braces.

On investigation the cause of these accidents or dangerous conditions was found to lie in the placing of improper and insufficient supports underneath the concrete forms, causing the forms to break down, even while pouring. In some cases, while the forms did not actually fall down, they began to sink slowly, to buckle, and to break the bond between the concrete and steel.

It has also been found on investigation that, where the supports were just about strong enough to carry the first floor concrete load, the



Figure 46. Collapse of concrete structure due to weak forms and inadequate supports, when the forms gave way and the structure fell two men were killed and one injured.

concrete set very slowly on account of weather conditions. The contractor added the next story and the extra weight caused the first floor to collapse.

A concrete floor is designed to carry a certain load per square foot, when the concrete has attained full strength. Until this strength is reached the supports must carry the entire load. The lower floors must sustain the weight of several floors above, the load being carried through the supports under the upper floors. The load on the supporting floors is reduced as the concrete sets, and is thus enabled to assist in carrying its own weight and a part of the load from above brought down to it. If the setting is retarded or the concrete freezes without setting, the hardening of the concrete does not relieve the load

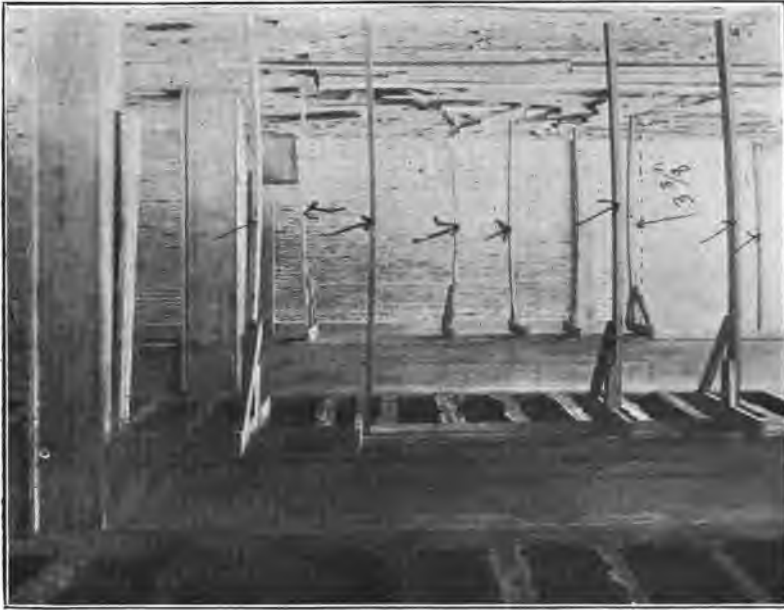


Figure 47. Second floor, note conditions of posts left under girder. Supports taken out from under slab. Girder 36 ft. long, 21 in. deep and 14 in. wide below ceiling. 2 in. by 6 in. posts below girder spaced 2 ft., 6 in. apart. Posts 11 ft., 0 in. long. All are buckled from $2\frac{1}{4}$ in. to $3\frac{1}{2}$ in.

on the supports. In such an event the lower supports gradually give, and when the contractor begins removing them, an accident must result. Our investigations also show that it is a common matter for contractors in placing forms to consider only the strength of the supports. *The strength of the floor*, which must sustain the *supports*, is not taken into account.

Forms should be designed not only for strength, but also for stiffness. Next to the proper design of the structural part, the proper design of the form is the most important part of reinforced concrete construction. The cost of the forms amount to on the average $33\frac{1}{3}$ per cent of the cost of the entire work under good management, and often reaches more under poor management. It is surprising to see

in how few instances the form work is designed by a competent person and *practically any foreman who declares himself competent* is given charge of the designing of fully 33 per cent of the work. Almost any contractor who has the courage to bid on a reinforced concrete construction job is awarded the contract for its execution as long as he is



Figure 48. Showing weakened support by splicing, arrow points to knot in timber. Note poor condition of support at top underneath joist.

the low bidder. This work should be entrusted to a designing engineer or architect.

The blame for this condition is not altogether the fault of the contractor. While we find numerous books of instruction on the treat-

ment of concrete, rods, etc., no handbook contains the methods, of construction of concrete forms, giving tables of how to place joists, stringers or girders and posts of different sizes of lumber. Therefore the ordinary foreman or contractor who has no technical education has had no guide or instructions to follow in the past.



Figure 49. Pressure of upper floor causes these insufficient and poorly spliced supports to bulge.

The article and tables given below were written and compiled by Mr. Ernest McCullough, C. E., a well known consulting engineer.

In following these tables it must be kept in mind that they were prepared for the use of straight grained, first class, full sized lumber.

Where dressed lumber is used, allowance must be made for additional timber or closer spacing, as in the case of so-called "dressed 4 by 4's" which actually measure only $3\frac{3}{4}$ by $3\frac{3}{4}$ or less.

When floors are combination tile and concrete, posts must not rest directly on the floor. They must rest on planks not less than 3 by 12



Figure 50. Another view of inadequate supports showing the extent to which even the top joist is forced out of alignment.

inches laid on the floor across the ribs between the tile. Posts made of two 2 by 4's or two 2 by 6's or two 2 by 8's spiked side by side should not be used. If solid 4 by 4 in., or solid 4 by 6 in., posts cannot be obtained, and built up posts are used they should be made in "T"

shape. Nails or spikes used in making "T" shape posts must be three times as long as the piece through which they are driven, so two-thirds of the length will be in the stem of the "T," and must be spaced not more than four times the thickness of the flange of the "T." The strength of a "T" shape post properly made is about two-thirds that of a solid piece of the same over-all dimensions. Care must be taken to distribute the load equally on both pieces of a "T" shape post.

Another dangerous practice is that of building up short posts by placing a number of blocks under them. Workmen passing by are liable to kick them from under the posts, or again, they may not be properly placed under the posts, the result of which is, that the posts slip off the built-up blocks, and the weight of the concrete is thrown on the floor.

On a reinforced concrete job the foreman ought to detail a man a certain time each day to pick up all loose pieces of boards having nails in them, to avoid the many serious accidents that arise as the result of men stepping on nails. In every case where a man steps on a nail or gets a slight scratch from a nail, he should receive the attention of a physician to avoid infection. The department's attention has been called to many serious cases where men have lost their limbs and lives as a result of infection from neglected wounds caused by stepping on nails.

THE SAFEGUARDING OF LIFE IN THE ERECTION OF REINFORCED CONCRETE BUILDINGS.

By Ernest McCullough, Chief Engineer, Fireproof Construction
Bureau, Portland Cement Association.

Wise economy in using forms is commendable. Foolish economy is criminal. Few architects exercise proper supervision over this very important item in the erection of reinforced concrete buildings. The loss of life in consequence is appalling and no lives should be lost. A person would think that bent centering indicates weakness but too many men do not regard it as dangerous, saying "When the concrete sets the pressure will be relieved." They do not know, or perhaps fail to realize, that while the centers are bending the concrete is moving and during this time it is also setting and hardening. Reinforced concrete owes its strength to the bond between the concrete and steel and a perfect bond cannot be obtained if there is any disturbance or movement of the materials during the three hours following the filling of the forms.

It is not uncommon to see centers ten feet long bent in a bow having an ordinate of seven or eight inches. Architects permitting this should have their license taken away. Inspectors on such work should be discharged and contractors using such methods should not be bonded by surety and casualty companies.

It is not uncommon to see two 2 inch by 4 inch pieces spiked together to make one 4 inch by 4 inch post. Men who understand the most elementary facts about column design know that such construction is bad. To see it on any job advertises the incompetency of the architect and his inspector, who are supposed to know such things. The ratio of slenderness fixes the strength of a column. For example, in the

Chicago Building Code a short block of white pine can be used with a safe fiber stress of 800 pounds per square inch. If the length divided by the *least* thickness equals 15, the safe fiber stress is 596 pounds per square inch. If the length divided by the *least* thickness equals 30, the safe fiber stress is 437 pounds per square inch. Assume a post 4 inches by 4 inches square and 5 feet long, the ratio is 30 and the safe fiber stress is 437 pounds per square inch, and the total safe load will be 16×437 equals 6,992 pounds.

If two 2 inch by 4 inch pieces are spiked together we really have two posts each 2 inches thick so the ratio becomes 60. Long experience has shown this to be dangerous and 30 is the limit set for wood. Experiments have proven that two pieces fastened together in this manner do not act together. If the load is not so distributed that each piece carries exactly one-half then one piece may be nearly gone before the other piece begins to help. It is impossible to use enough nails to make them act together as one piece.

Two 2 inch by 4 inch pieces should be spiked together in T shape with large nails not more than six inches apart. The least width is 4 inches and this should be used in figuring the slenderness ratio. One 2 inch by 4 inch forming a T with one 2 inch by 6 inch makes a post having a least thickness of 6 inches. Similarly one 2 inch by 6 inch forming a T with one 2 inch by 8 inch makes a post have a least thickness of 8 inches. If the pieces are not fastened together with 20d, or longer, nails or spikes six inches on centers they will not act properly as one piece. When properly made such posts have about 90 per cent of the strength of solid pieces of the same width and area. Built up posts should never be used if solid 3 inch by 4 inch, 4 inch by 4 inch or 6 inch by 6 inch can be purchased.

It is not uncommon to see the ends of posts resting directly on concrete floors, thus concentrating great weight on a small area. Occasionally a piece of wood one foot square is used under the post. This is especially bad when the floors consist of small concrete joists with tile or metal between, with very thin slabs of concrete covering these tile or metal forms. Holes have been punched through such floors many times by centers and posts under floors above.

Centers should be tied together in four directions so their greatest length will be no more than 30 times the least thickness. They should be vertical. The girders they carry should be positively over the center. Do not spike posts to sides of girders, or let girders rest on edge of posts. They should be full length and no blocks should be used at the lower end, for such blocks can be, and often are, knocked out. If wedges are used they should be double and as thin as possible. Under all posts planks should go clear across the floors to distribute the load. Spacing of centers at intervals of more than 6 feet should not be allowed for greater spacing will cause too heavy concentrations on the floors.

Slab forms usually consist of a platform of boards carried on joists and these joists are carried on girders, which in turn are carried by the posts, which are called centers. All girders should be braced about four feet apart to stiffen them like cross bridging stiffens floor joists. Tables are presented here fixing minimum sizes and maximum spacing of joists, girders and centers. In order to utilize the material carried by local lumber dealers a choice is given of sizes in all tables. For conven-

ience of reference Table 1 contains a description of the slabs with a number given to each slab. Reference is made to slab numbers in the tables following instead of to a slab thickness.

Several planks of the same wood used as beams may be spiked side by side and they will act as a solid piece, in this respect differing from pieces placed vertically and loaded on the end. Girders may therefore be built up.

LENGTH OF TIME FOR CENTERS TO REMAIN IN PLACE.

In pouring floors of buildings lumber should be provided for not less than three floors when the temperature is above 50° F. When the temperature is lower than 50° F., the amount of centering and forms must be increased.

When forms are removed from slabs, beams, girders and columns one-half of the centers must be put back and remain in place for not less than a week to permit the concrete to dry out and harden.

LENGTH OF TIME FOR FORMS TO REMAIN IN PLACE.

When the outside temperature is above 60° F. wall and column forms may be removed within 72 hours and the side forms may be removed from beams and girders the following day. Forms under bottom of slabs, spans of 6 feet or less, should remain in place 4 days, plus 1 day extra for each additional foot of span. Bottom of beams and girders less than 14 feet span, 14 days, plus 1 day for each additional foot of span.

When the average outside temperature during the period of setting is between 50° F. and 60° F., add four days time for underside of slabs, beams and girders and two days for columns and sides of beams and girders. When the outside average temperature during period of setting is between 40° F. and 50° F. and the interior temperature has not fallen below 40° F. do not remove forms from columns and the sides of beams and girders under ten (10) days. Forms to remain under slabs and on bottom of beams and girders for not less than two weeks.

When the average temperature falls below 40° F. the forms shall not be removed until careful tests show the concrete is set and is not frozen. The time given for forms to remain in place must be understood as the minimum length of time and in all cases before removing them care must be taken that the concrete has set hard enough to fully warrant their removal.

TO TEST CONCRETE FOR FREEZING.

Only one test is of value to determine whether concrete is frozen and this is by using hot water.

The water should have a temperature of not less than 150° F. and should not be boiling. A piece of frozen concrete immersed in hot water of this temperature will soften in from three to four minutes. To test a floor construct a tight dam to enclose an area several feet square, and keep four inches of hot water on it. If the floor does not soften in half an hour the concrete may be considered safe. The water will rapidly cool down when thus applied, but if at the end of half an hour it is still warm the desired result will be obtained. Water having a temperature of 70° F. is just as effective for making the test but is

slower in results, sometimes requiring several hours to thaw the concrete and bring out the frost. Deluging suspected concrete by hose for half an hour with hot water, or for several hours with tepid water has proven effective.

Boiling water may remove the frost and immediately start the setting action and so give false results.

CONCRETING IN COLD WEATHER.

When the outside temperature falls below 50° F. during working hours, or within an hour after quitting time the building should be enclosed.

When the temperature falls as low as 40° F. salamanders, or some other heating method, should be installed in the building and under no circumstances should the temperature within the building be permitted to fall below 40° F. while the forms and centers are standing.

When the temperature falls below 40° F., the contractor shall heat the water, sand and coarse aggregate and guard carefully against allowing frost or pieces of ice, or lumps of frozen material getting into the concrete.

The amount of water used during cold weather must be reduced and concrete deposited in forms must feel warm to the hand.

CONSISTENCY OF CONCRETE.

The use of concrete with so much water that it resembles the consistency known as "soupy" or "sloppy" should not be tolerated. The ideal consistency should be no softer than medium soft tooth paste and the maximum amount of water would not exceed six (6) pounds per cubic foot of cement, sand and coarse aggregate.

TABLES FOR FORMWORK.

The following tables should be followed in constructing forms and erecting centering, remembering the warning about built up posts. Solid posts should be used when possible. No departure should be made from same without filing in the office of the Illinois Department of Factory Inspection, complete detailed drawings, in duplicate, of the form work and centering by an Illinois licensed structural engineer, same to bear his signature and official seal; said forms and centering not to be used until same have been checked and approval given by the State inspector or proper deputy.

TABLE 1—SLAB NUMBERS.

Slab numbers.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Slab thickness in inches—																	
Solid slab.....	3	4	..	..	5	..	..	6	..	7	..	8	..	9	10	11	12
Combination tile and concrete..	..	6	7	8	..	9	10	11	12	13	14	..	15	..	..	..	..

TABLE 2—TABLE OF POSTS FOR CENTERING.

3 inches by 4 inches solid,	to be spaced 4 feet by 6 feet or less, under slabs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, braced in four directions every 7 feet.
	To be spaced 4 feet by 4 feet or less under slabs 11, 12, 13, 14, 15, 16, 17, and 4 feet apart under girders or beams.
4 inches by 4 inches solid,	or T post of 2-2 inches by 4 inches, properly spiked.
	To be spaced 6 feet by 6 feet or less, under slabs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, braced in four directions every 8 feet.
	To be spaced 4 feet by 6 feet or less, under slabs 11, 12, 13, 14, 15, 16, 17, or 5 feet apart under girders or beams.
6 inches by 6 inches solid,	or T post of 2 inches by 4 inches and 2 inches by 6 inches, properly spiked, braced in four directions every 8 feet.
	To be spaced 6 feet by 6 feet or less, under slabs 12, 13, 14, 15, 16, 17, or 6 feet apart under girders or beams.

It is important that the above requirements for length of posts be observed. They may be of any length to conform to clear height but must be tied in four directions so the greatest length from end to tie shall be not more than above stated. The ties may be horizontal or diagonal and should be well secured by nailing.

It is important that the posts rest at the lower end on a plank in order to distribute the load over the floor. Use a 2 inch by 12 inch for spacing of 4 feet by 6 feet; a 3 inch by 12 inch for spacing of 4 feet by 6 feet and 4 inch by 12 inch for spacing of 6 feet by 6 feet. These planks are parallel with and directly under the girders carrying the joists.

Posts must be full length and must not be used with blocks under the lower end. Wedges when used should be in pairs and thin. Do not drive nails through wedges for this interferes with adjustment. To prevent the working loose of wedges drive a nail into the plank or fasten a block to the plank, bearing against the heavy end of each wedge.

Care should be taken to have posts as nearly as possible directly over posts below in a vertical line from story to story.

All posts should be plumb. This is important.

TABLE 3.
Size and spacing of joists on 4-foot span.

Slab number.	Size, inches.	Spacing, inches.	Slab number.	Size, inches.	Spacing, inches.
1.....	{ 2 by 4	16 }	16.....	2 by 6	21
2 to 15 inclusive.	{ 2 by 4	24 }	17.....	2 by 6	21
	2 by 6	24 }			

TABLE 4.
Size and spacing of joists on 6-foot spans.

Slab number.	Size, inches.	Spacing, inches.	Slab number.	Size, inches.	Spacing, inches.
1, 2.....	{ 2 by 6	16 }	7, 8.....	{ 2 by 6	12
	{ 2 by 8	24 }		{ 2 by 8	24
3.....	{ 2 by 6	15 }		{ 2 by 6	12
	{ 2 by 8	24 }	9, 10, 11, 12, 13.....	{ 2 by 8	21
4, 5, 6.....	{ 2 by 6	14 }		{ 2 by 8	21
	{ 2 by 8	24 }	14, 15, 16, 17.....	{ 2 by 8	18

Flooring over joists may be $\frac{7}{8}$ -inch thick (1 inch dressed) on spans of less than 21 inches. It must be a full 1 inch ($1\frac{1}{4}$ inch dressed) on spans of 21 inches, and 24 inches. All joists to be crossbridged every four feet.

TABLE 5.
Minimum sizes of girders across posts on 4-foot span. Span of joists 4-foot or 6-foot.

Slab number.	Sizes, inches.	Slab number.	Sizes, inches.
1, 2.....	2 by 10, 3 by 8, or 4 by 6	15.....	3 by 10, 4 by 8, or 6 by 6
3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13..	2 by 10, or 3 by 8	16.....	3 by 10, or 4 by 8
14.....	2 by 10, 4 by 8, or 6 by 6	17.....	2 by 12, 3 by 10, or 4 by 8

TABLE 6.

Minimum sizes of girders across posts on 6-foot span. Span of joists 4-foot or 6-foot.

Slab number.	Sizes in inches.
1.....	2 by 12, or 3 by 10.
2, 8.....	3 by 12, 4 by 10, or 6 by 8.
4, 5, 6, 7, 8, 9.....	2 by 14, 3 by 12, 4 by 10, or 6 by 8.
10.....	2 by 14, 3 by 12, 5 by 10, or 6 by 9.
11.....	3 by 12, 6 by 9, or 7 by 8.
12, 13.....	3 by 12, 5 by 10, 6 by 9, or 7 by 8.
14.....	4 by 12, 5 by 10, or 6 by 9.
15.....	3 by 14, 4 by 12, 5 by 10, 6 by 9, or 8 by 8.
16.....	2 by 16, 3 by 14, 4 by 12, 5 by 10, 7 by 9, or 8 by 8.
17.....	2 by 16, 3 by 14, 4 by 12, 6 by 10, or 7 by 9.

Girders may be composed of several boards or planks side by side, care being taken to accurately size the pieces over bearings so they will act together. They should be spiked together and if 1 inch lumber is used with heavier stuff the thinner pieces should be inside. All girders to be braced or crossbridged every four feet.

Following the suggestions contained in Mr. McCullough's article it is absolutely necessary that a licensed structural engineer be attached to this department.

ACCIDENT INVESTIGATIONS.

The following list of accidents is classified according to the kind or causes of the accidents.

POURING CONCRETE.

Investigation of the death of three men engaged on a reinforced concrete structure in Alton disclosed the fact that the forms and supports gave way under far too great a load while concrete was being poured, causing men to fall a distance of sixty feet.

A panel of reinforced concrete broke down on a high school building in Bloomington and caused the death of a workman. This death was directly due to weak supports of the concrete forms.

On account of insufficient supports under a porch of a flat building in Chicago the form gave way while concrete was poured causing one of the workmen to receive a broken back and other injuries.

In a flat building on Franklin Boulevard, Chicago, the third story collapsed while a man was pouring concrete. The form broke killing one man instantly, while another was severely injured.

FALLING MATERIAL.

On October 16 a lather was killed in the Eiger building by reason of material falling down the elevator shaft. This fatality could have been avoided, if every other floor of the shaft had been covered.

A plumber was killed during the erection of the Kaiserhof Hotel, when a tile fell down the elevator shaft and struck him on the head. The plumber was assisting in hoisting bath tubs up the elevator shaft to the 14th floor.

While painting a smokestack on the premises of the Vienna Sausage Co., a painter fell from a boatswain chair suspended from the top of the stack a distance of 90 feet, and was killed instantly, leaving a wife and four small children. If a safety net had been suspended under the painter's scaffold this fatality could not have happened.

Two painters employed at the Municipal Blacksmith plant fell from a swinging scaffold a distance of 40 feet. If the bolster on the scaffold had had a safety stirrup attached the rope nose would not have slipped from stirrup. It was also found that the scaffold had no railing. One of the men was killed, the other severely injured.

DEFECTIVE SCAFFOLD.

Three men were seriously injured, when a temporary scaffold constructed by the use of bricklayers' trestle collapsed.

Two painters fell from a scaffold, a height of three stories, when a stirrup slipped off the end of a bolster. One man died, and the other suffered severe injuries.

Two tuck pointers were severely injured when a scaffold fell. The cause was the use of a defective rope, on which powerful acid had been spilled.

A tuck pointer was killed, because a 2 by 4 wooden bolster broke, causing scaffold to fall down.

A bricklayer was killed by a fall of 50 feet from a scaffold, which was not equipped with safety rail.

Falling off a defective scaffold constructed of loose planks a painter fell and fractured the bones in both legs.

Due to a poorly constructed scaffold a Greek laborer fell and injured himself, when the scaffold broke down.

An Austrian laborer had his foot crushed, when an I-beam fell on it.

A bricklayer came to his death, when a stack of brick carelessly piled up, fell on him throwing him a distance of 25 feet to a concrete floor.

A structural iron worker's spinal column was broken in two places when a falling hoist threw him off the second floor. He died after being taken to the hospital.

Due to a defective safety rail on a scaffold a tuck pointer fell three stories and was dead immediately.

A scaffold without a guard rail was responsible for an 18 foot fall, whereby an electrician received a compound fracture of the right leg, a broken arm, and many other injuries.

A painter, who attempted to reach a particularly high point under a gable roof, placed a step ladder on a scaffold and started to climb up. The swaying of the scaffold threw him backwards a distance of 30 feet. He was instantly killed.

An iron worker fell from a water tank, a distance of 150 feet, by reason of the breaking of the sling in which he was working killing him instantly.

Falling off an unguarded runway while pushing a wheelbarrow of mortar resulted in the death of an Austrian laborer.

A hoisting engineer was killed, because the floor on which he was working was not thoroughly planked over.

Due to the slipping of a board on a scaffold a paper hanger, who was working on the fifth floor near a stairway, fell to the second floor breaking his right leg and receiving scalp cuts.

While walking across a steel girder an iron worker slipped and fell a distance of 14 feet to the ground, sustaining a fracture of the skull from which he died two days later.

Attempting to lift a stone window sill in place while standing on a platform made of three 2 by 12 inch planks, a bricklayer, his foreman, and a plumber's helper fell a distance of 28 feet, when the platform broke in the middle. All were seriously injured.

Due to breaking of a defective plank while walking over it an iron worker fell a distance of 20 feet receiving severe injuries.

A plaster's helper attempted to walk across a stationary scaffold, when one of the planks broke in the middle causing him to fall on a salamander. He fractured one rib and received severe contusion of right thigh.

A carpenter fell while walking across an I-beam, fracturing his skull.

While placing tie rods between I-beams an iron worker attempted to step on a small plank, which was lying on one of the I-beams overreaching the beams. The end of the plank tipped up, throwing the iron worker a distance of 14 feet. He died 12 hours later.

While pouring concrete on the roof of an 80 foot elevator, three men, a concrete finisher, his foreman, and a laborer, dropped down inside the tank with the whole mass of concrete, when the forms gave way. The concrete finisher and foreman were killed instantly, while the laborer died several hours later.

The collapse of a two-story reinforced concrete structure caused the death of an American and an Italian laborer, who were working in the basement.

When the form of a concrete spout broke, it fell on a laborer, who was working directly underneath. The man's legs and ribs and one arm were broken.

A Swedish carpenter, while placing concrete forms on the third floor near a stairway well, was struck on the head by a falling box from an adjacent building, throwing him down to the basement. He broke both shoulder blades. If the floor below him had been covered, as required by law, the seriousness of the accident would have been greatly lessened.

Missing his foothold on a ladder, while carrying several short timbers, caused a laborer to fall down backwards, fracturing his skull. He died almost immediately.

A laborer slipped while descending on a continuous four-story ladder, and fell into the basement, receiving broken legs and other injuries. If a platform had been built at each story, and the ladders run from one story to the next, this accident might have been avoided.

While climbing a ladder placed on an ice-covered spot, a carpenter was severely injured, when the ladder slipped out from under him.

An Italian laborer died in three days as a result of blood poison after having stepped on a nail.

While sweeping near a skylight a laborer accidentally stepped on the glass and fell a distance of 25 feet, breaking his right leg.

An Italian laborer broke his leg and ribs and received a punctured lung in a fall from a defective and unguarded platform.

Breaking of a rope caused the scaffold to fall on which a sheet metal worker was engaged, while placing a water spout. The man fell six stories and was dead when picked up.

Attempting to climb up on a bridge an iron worker fell about 10 feet and was badly bruised.

On account of failure to provide a canopy a laborer was struck by a brick falling from the eighth floor. His left shoulder was broken.

When a platform with two men on it fell a distance of 10 feet, it caused the breaking of both legs of a laborer who was working directly beneath.

Engaged in passing lumber, 2 by 6 by 20 joists, from the street to the second floor a laborer received a fractured skull, when one of the joists, which had been placed against the building, fell over and struck him on the head.

If the second-story floor had been covered the life of a laborer, who was working on the ground floor, would have been spared. A short piece of rafter fell from the roof through the second story striking the laborer on the head. He died an hour later.

While passing mortar to a bricklayer a laborer fell from the roof, a distance of 50 feet, and was dead instantly. Had a platform or safety net been placed below the point, where these men were working, this accident could have been avoided.

The accidental kicking of a water bucket by a window washer, who was engaged on the seventh story, was responsible for the injury of a pedestrian. This man would doubtless have died, if the force of the bucket had not been broken by glancing off a projecting ornament.

While standing on a scaffold, which had no guard rail, a laborer received severe injuries, when the scaffold under a bridge was shaken by a passing train.

A rigger fell a distance of about 100 feet receiving severe injuries, when a pole approximately 126 high, which was defective and spliced in three places, fell and struck him.

Falling from a bridge a distance of 50 feet an iron worker was killed, by reason of insecure planking.

When the wall over which a scaffold hook had been placed crumbled, a sign painter fell with the scaffold and was killed.

A plasterer stepping on the end of a loose platform tipped over and was thrown violently on a concrete floor. He received a fractured skull and died in a few hours.

Failure of properly bracing a bricklayer's scaffold, caused a load of material to fall on a laborer, which crushed his legs.

WORK OF INSPECTION.

Table No. 1 shows in concise form the results of inspections in the enforcement of this law. One thousand and fifty-four inspections are recorded for 553 jobs, the nature of the work being indicated in the table. The majority of jobs inspected were performed in Chicago and

Cook County on account of the greater building activity of the larger class of structures in this city. However, a number of erection jobs were given close attention in cities located outside of Cook County. This is the second year in the history of this department that inspections according to the provisions of this law were made outside of Chicago. Over 14,000 men were engaged on buildings in Chicago, and over 5,000 on work outside of Cook County. In 435 instances orders were issued to insure safe working conditions, as outlined in the law. Although the reporting of accidents to one official or one State department is not compulsory, this department has endeavored to keep a list of accidents as complete as possible under the circumstances. Such contractors as come under the "Compensation Law" report accidents to the Industrial Board, but those having refused to avail themselves of the services of the Industrial Board or the provisions of the "Compensation Law" generally fail or neglect to report accidents of their workmen. The records of the department, though far from complete, show that during the last year 47 fatal and 101 nonfatal accidents happened. Attention is called to the fact that the number of accidents was exceedingly high. For Chicago and Cook County 36 fatal and 89 nonfatal accidents are reported, while in the cities outside of Cook County this department investigated 11 fatal accidents and 12 involving severe injuries. A partial list of the more serious accidents, showing the causes accounting for the numerous deaths and injuries is presented elsewhere in this report.

TABLE NO. 1—SUMMARY OF INSPECTIONS ACCORDING TO THE STRUCTURAL LAW FOR THE ENTIRE STATE FOR THE YEAR.

July 1, 1915, to June 30, 1916.

Location.	Number of jobs.								Number of inspections.	Number of men engaged on jobs.	Number of orders issued.	Number of accidents.			
	Total.	Erecting.	Repairing.	Altering.	Wrecking.	Cleaning.	Painting.	Excavating.				Miscellaneous.	Total.	Fatal.	Nonfatal.
Chicago and Cook County.....	483	366	10	16	8	20	45	18	.....	956	14,524	377	125	36	89
Outside of Cook County.....	70	66	1	2	....	1	....	....	.....	98	5,066	58	23	11	12
Total for entire State....	553	432	11	18	8	21	45	18	.....	1,054	19,590	435	148	47	101

The second table presents the various kinds of work performed in Cook County on the structures designated. Two hundred and forty-one dwellings, stores and apartment buildings while under construction received 306 inspections. Four fatal and nine nonfatal accidents are reported for this class of buildings. Fifty-nine erection jobs of the regular skyscraper type were subjected to 322 inspections and our records show ten deaths, and twenty-one cases of severe injury during the year. Thirty-six inspections of bridges and pier construction work were made resulting in the discovery of three fatal and six nonfatal accidents. Twelve high stacks and tanks in the course of erection required twenty-

two inspections; five cases of death being reported and eleven of severe injuries.

Painting of apartment houses, office buildings and churches, and stacks and elevators, necessitated numerous inspections. Ten fatal and thirty-five nonfatal accidents happened mostly on account of failure to provide adequate scaffolds.

Excavating work was confined to office building foundations; the dangers to be guarded against in this kind of work is entirely different from any of the above mentioned classes of labor. In excavating or well digging one of the principal factors is fresh and pure air. Then again the hoisting apparatus must be safe. This subject was taken up more in detail under discussion of the orders issued to excavating contractors in our last annual report.

TABLE NO. 2—INSPECTIONS ACCORDING TO THE STRUCTURAL LAW—COOK COUNTY.

July 1, 1915, to June 30, 1916.

Nature of work.	Class of building.														
	Dwellings, stores and apartments.					Office buildings and hotels.					Schools and churches.				
	Number of jobs.	Number of in- spections.	Number of em- ployees on job.	Acci- dents.		Number of jobs.	Number of in- spections.	Number of em- ployees on job.	Acci- dents.		Number of jobs.	Number of in- spections.	Number of em- ployees on job.	Acci- dents.	
				Fatal.	Nonfatal.				Fatal.	Nonfatal.				Fatal.	Nonfatal.
Erecting	241	306	3,081	4	9	50	322	6,815	10	21	38	61	1,332	2	4
Repairing	6	6	28	.....	.....	4	4	37	.....	.....	.....	.....	.....	.....	.....
Altering .....	.....	.....	.....	.....	.....	12	16	72	.....	.....	.....	.....	.....	.....	.....
Wrecking .....	.....	.....	.....	.....	.....	8	12	131	.....	.....	.....	.....	.....	.....	.....
Cleaning and tuck- pointing	2	2	6	.....	2	16	23	32	2	4	2	5	26	.....	.....
Painting	18	29	124	2	8	7	15	48	3	8	10	18	48	.....	3
Excavating .....	.....	.....	.....	.....	.....	18	54	1,592	.....	.....	.....	.....	.....	.....	.....
Concrete work .....	.....	.....	.....	1	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....

TABLE NO. 2—Concluded.

[illegible]

The third table shows the kind of orders issued and the nature of the work performed on certain classes of buildings. In 82 instances, mostly on erecting, cleaning and painting jobs, it was essential to provide safe scaffolds. Safe temporary floors were laid upon orders of the deputy inspector in 8 cases. Rails around floor openings or around dangerous machinery were placed in position in 77 instances. The deputy inspector found 117 hoisting machines in an unsafe condition and gave that number of orders to insure safety. Barricades 8 feet in height were ordered around elevator shafts in 37 cases. For the purpose of encasing of signal systems on erecting jobs twelve orders were given. Numerous orders were issued to brace concrete forms, but in almost all cases these orders were given upon investigation of accidents, which were traced to this point of weakness in construction.

TABLE NO 3—CLASSIFICATION OF ORDERS OF INSPECTIONS ACCORDING TO THE STRUCTURAL LAW—CHICAGO AND COOK COUNTY.

July 1, 1915, to June 30, 1916.

Kind of orders.	Dwellings, stores and apartments on which orders were issued.							Office buildings and hotels on which orders were issued.							Schools and churches on which orders were issued.						
	Nature of work.							Nature of work.							Nature of work.						
	Erecting.	Repairing.	Altering.	Wrecking.	Cleaning.	Painting.	Excavating.	Erecting.	Repairing.	Altering.	Wrecking.	Cleaning.	Painting.	Excavating.	Erecting.	Repairing.	Altering.	Wrecking.	Cleaning.	Painting.	Excavating.
Safe scaffolds.....	24					12		12	4	2	1	2	1		1					2	2
Proper floor supports.....	4							3													
Safe tackle, etc.....	2							2	1	2											
Safe temporary floor.....	2							16													
Rails.....	21					6		12	3		3	16									
Safe hoisting machinery.....	55							41		1		12		4							
Barricades.....	2							18						2							
Signal systems.....	2							3													
Reinforced concrete forms.....								3													

TABLE NO. 3—Concluded.

Kind of orders.	Docks, piers, bridges, viaducts on which orders were issued.							Stacks, tanks and elevators on which orders were issued.						
	Nature of work.							Nature of work.						
	Erecting.	Repairing.	Altering.	Wrecking.	Cleaning.	Painting.	Excavating.	Erecting.	Repairing.	Altering.	Wrecking.	Cleaning.	Painting.	Excavating.
Safe scaffolds.....	6							10						2
Proper floor supports.....														
Safe tackle, etc.....														
Safe temporary floor.....	4							3						
Rails.....	3							3						
Safe hoisting machinery.....	2													
Barricades.....	3													
Signal systems.....	2													
Reinforced concrete forms.....	2							2						

* Orders for installation of safety nets.

The fourth table enumerating the cities outside of Cook County, in which inspections were made, shows the number of jobs and how often inspected, the number of men engaged at work, the orders issued, and the number of accidents.

Until the past year no inspections according to the provisions of the "Structural Law" had been made outside of Cook County. During the fiscal year 23 cities, in which the erection of new buildings was under way, were visited by the inspector.

With the exception of one job in Aurora, two jobs in Springfield, and one in Waukegan, all of the work consisted of erecting new structures. A total of 57 jobs were inspected 82 times.

Ninety-eight inspections of 70 jobs were made outside of Cook County.

Five thousand and sixty-six men were employed on this work.

Twenty-three accidents were investigated, eleven of which proved fatal and twelve nonfatal.

TABLE NO. 4—INSPECTIONS ACCORDING TO THE STRUCTURAL LAW IN CITIES OUTSIDE OF COOK COUNTY.

July 1, 1915, to June 30, 1916.

Name of city.	Number of jobs.	Number of inspections.	Number of employees on job.	Accidents.		Nature of work.	Class of building.	Order issued.
				Fatal.	Nonfatal.			
Alton	2	2	254	3	...	Erecting ..	Elevator	Belt at flywheel guarded, material hoist guarded.
Aurora	3	7	78	1		..do.....	Factory.....	Safeguard circular saw.
						..do.....	Hotel.....	Ladder on concrete tower.
						..do.....	Automobile building	Concrete forms, material hoist.
Bloomington ..	3	4	125	2	1	Painting ..	Signboard.....	Defective scaffold.
						Erecting ..	Theatre.....	Rails on scaffolds and runways.
						..do.....	High school.....	Rails around shafts.
Champaign.....	5	10	126			..do.....	City waterworks ..	
						..do.....	Department store..	
						..do.....	Auto building.....	Material hoist guarded.
						..do.....	Church.....	
						..do.....	Store and offices ..	Faulty concrete forms.
Danville.....	4	4	153	1		..do.....	University.....	Defective scaffolds.
						..do.....	Print shop.....	Material hoist guarded.
						..do.....	Office building.....	Material hoist guarded.
						..do.....	Factory.....	Temporary platforms.
Decatur.....	5	9	305	1		..do.....	Smokestack.....	Hoist enclosed.
						..do.....	Store.....	Material hoist guarded.
						..do.....	Paper bag factory..	
						..do.....	Hotel.....	Elevator shafts guarded, circular saw guarded.
						..do.....	Grain elevator.....	
East St. Louis.	3	4	313	1	1	..do.....	Theater.....	Material hoist guarded, scaffolds reinforced, rail on runway.
						..do.....	Bridge.....	
						..do.....	High school.....	Shafts guarded, material hoist guarded.
						..do.....	Warehouse.....	Concrete tower ladder guarded, two circular saws guarded, flywheel guarded.
Elgin	1	1	5	...	...	..do.....	State hospital	
Galesburg.....	3	3	57			..do.....	Barn	Material hoist guarded.
						..do.....	Blacksmith shop ..	Railing on staging, reinforced scaffolds.
Hegewisch	1	1	22	1		..do.....	Theater.....	
						..do.....	Foundry.....	

TABLE NO. 4—Concluded.

Name of city.	Number of jobs.	Number of inspections.	Number of employees on job.	Accidents.		Nature of work.	Class of building.	Order issued.
				Fatal.	Nonfatal.			
Joliet	2	2	459			Erecting ..	Steel mill.....	
Keokuk.....	1	1	32			..do.....	Hotel.....	
Kewanee.....	1	1	25			..do.....	Bridge.....	
Metropolis.....	1	2	700	1		..do.....	Hotel.....	
						..do.....	Bridge.....	Emery wheels guarded. belts and flywheels guarded, rails on runway.
Mooseheart.....	1	1	57			..do.....	Industrial building..	
North Chicago.....	1	1	18			..do.....	Laboratory ..	
Ottawa.....	2	2	59			..do.....	High school, armory	Material hoist guarded.
Pekin.....	1	1	23			..do.....	Courthouse.....	Material hoist guarded.
Peoria.....	9	10	393	1		..do.....	Department store...	Bell cords enclosed.
						..do.....	County jail.....	
						..do.....	Office building.....	Shaft openings guarded, material hoist guarded.
						..do.....	High school	
						..do.....	Church.....	
						..do.....	Warehouse.....	Openings in floor guarded, material hoist guarded.
						..do.....	Store.....	Belts and pulleys on hoist guarded.
						..do.....	Bank building	Concrete forms reinforced.
						..do.....	Service building.....	Material hoist guarded.
Quincy.....	1	1	40			..do.....	School.....	Rails on runways.
Rockford.....	12	15	245	2	3	..do.....	Factory.....	
						..do.....	Courthouse.....	
						..do.....	Store.....	Material hoist guarded.
						..do.....	Store and offices ..	
						..do.....	Store.....	
						..do.....	Grain elevator.....	Supports for concrete forms, material hoist guarded.
						..do.....	Print shop	Supports for concrete forms.
						..do.....	Bridge.....	Rails on platforms.
						..do.....	Factory.....	
						..do.....	Store.....	Material hoist guarded.
						..do.....	Store and factory ..	Material hoist guarded.
Springfield.....	4	4	288	1		Repairing..	Office building.....	Circular saw, flywheel, belts and hoist guarded.
						Painting ..	..do.....	
						Erecting ..	Factory.....	
						..do.....	..do.....	
Urbana.....	1	9	127	1		..do.....	Three university buildings.....	Supports under mast of derrick, material hoist guarded.
Waukegan.....	3	3	1,162	1	1	..do.....	Factory.....	
						..do.....	..do.....	
						Cleaning ..	Store.....	
Total.....	70	98	5,066	11	12			

An amendment to the "Structural Safety Law" should be made, that all architects be compelled to furnish contractors with detailed drawings of the form work and centering to be used in the construction of reinforced concrete structures. These drawings should be verified under the signature and official seal of an Illinois licensed structural engineer.

RESULTS OF INSPECTIONS ACCORDING TO THE "WOMEN'S TEN HOUR LAW."

The "Women's Ten Hour Law" was enacted in 1909, and amended in 1911.

The present law regulates and limits the hours of employment of females in mechanical or mercantile establishments, in factories, in laundries, in hotels and restaurants, in telegraph and telephone establishments, in places of amusement, in the express, transportation and public utility business, and applies to any common carrier or any public institution incorporated or unincorporated.

The important items of the law are:

(1) No female shall be required to work more than 10 hours in any one day.

(2) The employer of female help must keep a time record, showing for each day of labor the hours during which female help is employed.

On account of the strict enforcement of this law during the preceding years, when 627 prosecutions instituted by the department terminated in convictions, the general observance of this law is fairly satisfactory. The number of cases of over "Ten Hour Violations" has diminished, because employers have become acquainted with the law and because they know that this department insists upon a strict compliance. The cases of employers failing to keep time records as provided for in section 5 of the law are still numerous, though on the decline.

Two kinds of time records are acceptable to this department: a daily schedule showing the hours of each female employee in writing, or a time clock which punches the exact hour and minutes. Time clocks which show time by perforation, dash, star or other sign will not be considered.

The question has often been raised of how long a time employers should preserve these time records. The department has always advised employers to keep a continuous record on file for a period of six months.

In many cases employers engage female help only during certain seasons of the year. In such cases it is advisable that the employer indicate on his record the periods for which no female help was employed. This will avoid numerous questions, when the deputy inspector examines the time records.

Thirty-three states, the District of Columbia, and the territory of Porto Rico provide for shorter hours for women than does the State of Illinois. Based upon a combination of the hours per day and week, Illinois occupies the very low rank of 36th. The relative position of the various states in respect to the working hours of women is as follows:

- | | | |
|--------------------------|--------------------|---------------------|
| 1. Porto Rico. | 14. Montana. | 28. Kentucky. |
| 2. Arizona. | 15. Connecticut. | 29. Louisiana. |
| 3. California. | 16. Delaware. | 30. Maine. |
| 4. Colorado. | 17. Massachusetts. | 31. Maryland. |
| 5. District of Columbia. | 18. Michigan. | 32. Mississippi. |
| 6. Washington. | 19. New Hampshire. | 33. New Jersey. |
| 7. Oregon. | 20. Ohio. | 34. North Carolina. |
| 8. Missouri. | 21. Pennsylvania. | 35. South Carolina. |
| 9. Nebraska. | 22. Rhode Island. | 36. Illinois. |
| 10. New York. | 23. Tennessee. | 37. North Dakota. |
| 11. Utah. | 24. Texas. | 38. Oklahoma. |
| 12. Minnesota. | 25. Vermont. | 39. South Dakota. |
| 13. Idaho. | 26. Wisconsin. | 40. Virginia. |
| | 27. Georgia. | |

Since 1844 Great Britain has limited the hours of labor for adult women; France followed this class of legislation in 1848; Switzerland adopted it in 1848, Austria in 1885, Holland in 1889, Germany in 1891, Nova Scotia in 1901, Italy in 1902 and South Australia in 1907.

Experience teaches us that long hours of employment for women is dangerous due to their special physical organization, especially in connection with the strain incident to factory work. Women do not possess the power of endurance, as men, therefore exhaustion due to long hours will show a more disastrous effect upon the health of women and the injury will be of a more lasting nature.

The sickness insurance records of foreign countries prove that the morbidity of women is higher than that of men in industrial pursuits. Statistics of these countries state that women lose a greater number of working days through illness than men. The average period of illness of women is of longer duration than that of men, and morbidity statistics show that the death rate among working women is higher than that of men, and also higher than that of women, who are not employed.

A study of the laws of other states relating to female labor reveals that it has been the special aim of the legislators to protect and preserve the health of the women in their character as wives, and as the mothers of future generations. The statutory regulations are intended to prevent injury to health through over-long hours, or the resumption of work too soon after confinement, often the cause of serious illness which may render the patient incapable of bearing healthy-offspring. As long as employment of women in factories and shops is a necessity, even for married women, it is all the more desirable that protective legislation should be so extended and work out in such detail as to insure the fullest attainment of its object, namely, protection for the health of the female working population, as well as for the family and the home, by shortening the working hours.

The following table shows the number of establishments visited and inspected for the purpose of enforcing the "Women's Ten Hour Law."

TABLE NO. 1.

Location.	Year.	Number of establishments visited.	Number of inspections.	Number of employees.		
				Total.	Males.	Females.
Chicago and Cook County ..	1915-16	13,252	16,663	398,475	209,157	189,318
	1914-15	8,958	10,904	250,643	167,788	82,855
Outside of Cook County....	1915-16	7,809	9,392	185,968	137,510	48,458
	1914-15	4,033	5,853	94,472	73,999	20,473
Total, entire State.....	1915-16	21,062	26,055	584,443	406,667	177,776
	1914-15	12,991	16,757	345,115	241,787	103,328

Reference to the preceding table shows that 26,055 inspections were made in 21,062 establishments in the entire State. Of this total number 16,663 inspections are credited to 13,253 places of business located in Chicago and Cook County. In cities situated outside of Cook County 9,392 inspections were recorded for 7,809 places of employment.

Comparing these figures with those of the preceding year we find the number of inspections in the entire State increased by 9,298 and the

number of establishments visited by 8,071. In Cook County 4,295 more establishments were visited, while the number of inspections exceed those of the previous year by 5,759. In cities outside of Cook County the number of inspections were increased to 3,539, while 3,776 more places of business were visited.

Table No. 2, which is appended, shows the number of inspections made and the number of places of employment visited during the year in 321 cities and towns outside of Cook County.

TABLE NO. 2.

City or town.	Number of establishments.	Number of inspections.	Total.	Males.	Females.
Abingdon.....	38	60	512	366	146
Albany.....	4	4	13	7	6
Albion.....	15	16	178	153	25
Aledo.....	31	31	79	39	40
Algonquin.....	1	1	16	15	1
Altamont.....	4	6	24	20	4
Alton.....	90	94	3,375	2,596	779
Amboy.....	15	15	57	28	29
Anna.....	18	13	408	172	231
Annawan.....	3	3	10	5	5
Antioch.....	3	3	11	6	5
Apple River.....	3	3	6	3	3
Arcola.....	12	12	45	22	23
Area.....	1	1	1	.....	1
Arthur.....	7	7	22	11	11
Assumption.....	12	12	41	17	24
Ashley.....	4	4	14	9	5
Astoria.....	7	7	39	16	13
Aurora.....	249	366	15,032	10,493	4,539
Bartonville.....	2	2	6	4	2
Barrington.....	5	5	36	8	28
Barry.....	4	4	18	5	13
Batavia.....	16	19	598	550	48
Belmont.....	2	2	3	1	2
Belvidere.....	90	109	2,472	1,921	551
Belleleville.....	24	24	375	190	185
Benton.....	15	15	68	31	37
Blandinsville.....	4	4	12	5	7
Bloomington.....	255	255	7,707	6,405	1,302
Bluffs.....	1	1	4	1	3
Breese.....	11	11	32	17	15
Bridgeport.....	13	21	66	42	24
Brookport.....	2	2	51	49	2
Buda.....	11	13	52	36	16
Bunker Hill.....	5	5	16	7	9
Bushnell.....	24	31	234	158	76
Byron.....	7	7	93	81	12
Cairo.....	152	152	2,303	1,833	470
Caledonia.....	3	4	4	1	3
Cambridge.....	7	7	28	16	12
Canton.....	58	58	458	274	184
Carbondale.....	7	7	35	14	21
Carlisle.....	14	14	75	37	38
Carlyle.....	13	18	79	51	28
Carmi.....	14	14	70	37	33
Carpentersville.....	3	8	641	596	45
Carrollton.....	11	11	52	20	32
Carthage.....	19	23	79	31	48
Carey.....	3	3	6	3	3
Casey.....	11	11	49	22	27
Cedar Point.....	1	1	2	1	1
Centralia.....	51	59	1,173	863	315
Champaign.....	225	230	3,506	1,859	1,647
Charleston.....	30	30	243	103	140
Chenoa.....	1	1	148	87	61
Cherry Valley.....	1	1	2	1	1
Chester.....	7	7	135	34	101
Chillicothe.....	1	1	67	48	9
Chrisman.....	8	8	16	5	11
Christopher.....	7	7	32	22	10
Clayton.....	6	6	19	9	10

TABLE NO. 2—Continued

City or town.	Number of establish- ments.	Number of inspec- tions.	Total.	Males.	Females.
Clifton.....	1	1	3	1	2
Coffeen.....	1	1	2	1	1
Colchester.....	6	7	31	8	32
Columbia.....	2	2	5	3	2
Collinsville.....	33	33	354	123	231
Coulterville.....	2	2	5	2	3
Cuba.....	5	5	14	4	10
Cordova.....	1	1	14	4	10
Dallas City.....	9	13	55	36	19
Danville.....	64	64	3,439	2,970	469
Decatur.....	116	134	3,239	2,824	415
DeKalb.....	198	182	3,110	2,636	474
DePue.....	5	5	1,094	1,015	9
Dixon.....	44	50	1,274	994	350
Dundee.....	13	13	144	113	31
Duquoin.....	21	21	98	55	38
Durand.....	4	4	7	2	5
Dwight.....	13	13	75	44	31
Earlville.....	11	18	43	22	21
East St. Louis.....	190	123	8,758	7,847	911
Edwardsville.....	27	27	137	72	65
Effingham.....	27	38	220	124	96
Eldorado.....	6	6	49	38	11
Elgin.....	40	51	5,759	2,802	2,957
Elizabeth.....	4	4	8	2	6
ElPaso.....	3	4	120	85	35
Eola.....	1	1	18	13	5
Erie.....	7	16	24	13	11
Eureka.....	6	7	212	151	61
Fairbury.....	9	9	46	13	33
Fairfield.....	16	19	437	131	306
Farina.....	6	10	23	10	13
Farmington.....	36	40	148	83	65
Federal.....	1	2	150	149	1
Flora.....	19	22	112	56	56
Flannigan.....	2	2	6	4	2
Franklin Grove.....	1	1	5	4	1
Freeport.....	107	147	3,134	2,463	671
Forrest.....	1	1	34	33	1
Forrester.....	7	7	25	10	15
Fulton.....	11	11	98	46	52
Galena.....	35	35	390	232	158
Galesburg.....	218	249	2,721	1,728	993
Galva.....	29	34	318	241	77
Geneseo.....	39	43	233	187	96
Geneva.....	2	2	112	66	46
Genoa.....	4	8	158	112	46
Georgetown.....	6	6	16	4	12
Gibson City.....	11	11	399	267	132
Gillespie.....	21	21	56	32	24
Girard.....	16	16	29	13	16
Glasford.....	7	7	66	57	9
Grand Ridge.....	1	1	4	1	3
Granite City.....	20	20	268	216	52
Granville.....	10	10	12	3	9
Grays Lake.....	4	4	13	8	5
Greenfield.....	3	3	16	7	9
Greenup.....	12	12	51	32	19
Greenville.....	60	60	689	372	317
Gridley.....	9	9	28	15	13
Griggsville.....	1	1	7	6	1
Hamilton.....	5	6	33	6	27
Hampshire.....	1	1	9	8	1
Hanover.....	6	6	187	130	57
Harrisburg.....	6	6	26	15	11
Harvard.....	15	15	315	260	55
Henry.....	30	45	68	46	22
Herrin.....	5	5	100	45	55
Highland.....	5	5	55	34	21
Highland Park.....	40	61	296	153	143
Highwood.....	2	2	9	6	3
Hillsboro.....	28	28	505	442	63
Hinckley.....	4	4	12	5	7
Hoopeston.....	2	2	588	477	111
Huntley.....	1	1	2	.....	2
Jacksonville.....	244	281	2,609	1,476	1,133
Jerseyville.....	17	17	355	222	133

TABLE NO. 2—Continued.

City or town.	Number of establish- ments.	Number of inspec- tions.	Total.	Males.	Females.
Johnston City.....	14	14	49	22	27
Joliet.....	222	260	5,752	4,724	1,028
Jonesboro.....	3	3	31	25	6
Kane.....	1	1	15	5	10
Kankakee.....	42	42	1,438	586	852
Kansas.....	6	6	20	9	11
Keithsburg.....	4	4	23	16	7
Kewanee.....	100	134	4,910	3,860	1,050
Kingston.....	1	1	2	1	1
Kinmundy.....	7	9	34	15	19
Kirkland.....	4	4	25	19	6
Knoxville.....	19	23	68	31	37
Lacon.....	30	51	223	130	93
LaHarpe.....	4	4	15	5	10
Lake Forest.....	15	15	119	65	54
Lake Villa.....	1	1	4	2	2
LaMoille.....	7	7	25	10	15
Lanark.....	1	1	40	30	10
LaSalle.....	166	213	3,617	3,024	593
Lawrenceville.....	35	50	591	506	85
Leland.....	1	1	4	1	3
Lena.....	17	17	25	10	15
Leonora.....	4	4	9	5	4
Leroy.....	1	1	169	101	68
Lewiston.....	9	9	41	14	27
Libertyville.....	12	12	119	68	51
Lincoln.....	22	22	191	74	117
Litchfield.....	118	118	263	155	108
Livingston.....	5	5	17	8	9
Lostant.....	6	6	16	8	8
Mackinaw.....	6	6	25	15	10
Macomb.....	39	54	599	242	157
Malta.....	4	4	12	4	8
Marengo.....	12	12	68	34	34
Marion.....	23	23	160	61	99
Marseilles.....	12	12	434	388	51
Marshall.....	12	12	8	7	1
Martinsville.....	9	9	43	26	17
Mattoon.....	56	56	1,047	805	242
McLeansboro.....	7	7	24	11	13
Mendota.....	52	65	326	202	124
Metamora.....	2	2	7	3	4
Metropolis.....	9	9	185	162	23
Milford.....	7	7	297	243	54
Mill Shoals.....	1	1	16	6	10
Minonk.....	10	12	108	92	16
Minooka.....	1	1	2	1	1
Moline.....	24	24	834	305	529
Momence.....	2	2	8	5	3
Monroe.....	1	1	2	1	1
Montgomery.....	2	4	334	328	16
Mooseheart.....	2	2	185	163	22
Morris.....	33	96	622	489	133
Morrison.....	27	28	359	289	70
Morrisonville.....	3	3	16	12	4
Morton.....	10	10	102	79	23
Mound City.....	4	4	331	235	96
Mounds.....	3	3	2,034	2,020	14
Moweaqua.....	5	5	23	9	14
Mt. Carmel.....	14	71	840	615	225
Mt. Morris.....	8	8	128	97	31
Mt. Olivet.....	40	40	81	47	34
Mt. Sterling.....	3	3	30	10	20
Mt. Vernon.....	37	37	1,574	1,375	199
Mulberry Grove.....	3	3	9	5	4
Murphysboro.....	46	51	1,206	904	302
Nashville.....	6	6	52	37	15
National Stock Yards.....	3	3	3,159	2,795	364
Neoga.....	13	13	43	22	21
New Athens.....	4	4	16	8	8
New Boston.....	13	13	7	4	3
Newton.....	10	34	116	56	60
Noble.....	10	12	122	61	61
Normal.....	25	26	143	83	60
North Chicago.....	22	30	1,749	1,436	313
Oakland.....	8	8	40	16	24
Odell.....	4	4	13	4	9

TABLE NO. 2—Continued.

City or town.	Number of establish- ments.	Number of inspec- tions.	Total.	Males.	Females.
Odin.....	7	8	68	35	33
Oglesby.....	14	18	851	806	45
Ohio.....	14	14	14	5	9
Olney.....	46	58	347	208	139
Onarga.....	1	1	411	320	91
Oneida.....	5	5	13	6	7
Orangeville.....	3	3	8	5	3
Oregon.....	13	16	320	288	32
Orion.....	8	8	9	5	4
Ottawa.....	73	82	1,561	1,165	396
Pana.....	36	36	205	115	90
Paris.....	68	68	404	135	269
Paxton.....	22	24	284	204	80
Pearl City.....	5	5	11	4	7
Pecatonica.....	26	33	112	86	26
Pekin.....	69	77	2,726	2,505	221
Peoria.....	531	953	14,911	10,353	4,558
Peru.....	67	73	5,672	4,222	1,450
Petersburg.....	1	1	45	15	30
Pinckneyville.....	12	13	40	28	12
Pittsfield.....	10	10	54	22	32
Plainfield.....	5	6	39	34	5
Plano.....	27	29	89	29	60
Polo.....	18	18	79	28	51
Pontiac.....	26	26	569	420	149
Poplar Grove.....	5	5	12	6	6
Princeton.....	62	63	178	100	78
Prophetstown.....	6	6	30	20	10
Rauson.....	3	3	8	4	4
Ravinia.....	1	2	21	11	10
Ravinia Park.....	1	2	32	30	2
Red Bud.....	3	3	34	30	4
Reservoir Heights.....	2	2	5	3	2
Ridott.....	1	2	2	1	1
Roodhouse.....	7	7	53	28	25
Roanoke.....	3	4	8	5	3
Robinson.....	35	45	262	176	86
Rochelle.....	28	31	240	178	62
Rock Falls.....	20	20	798	725	73
Rockford.....	72	99	6,545	5,259	1,286
Rock Island.....	38	45	1,169	354	815
Rockton.....	4	4	6	2	4
Roseville.....	1	1	118	96	22
Roudott.....	1	1	38	35	3
Rushville.....	4	4	22	9	13
Rutland.....	9	9	27	7	20
Salem.....	23	33	169	79	90
Sandoval.....	3	3	11	6	5
Sandwich.....	26	33	413	368	45
Scales Mound.....	3	3	9	1	8
Seneca.....	3	6	9	6	3
Shabbona.....	5	5	13	4	9
Shawneetown.....	4	4	13	4	9
Shelbyville.....	25	25	121	60	61
Sheldon.....	3	3	9	3	6
Sherrard.....	3	3	5	2	3
South Beloit.....	6	6	724	514	210
South Pekin.....	1	1	190	185	5
Sparlund.....	4	4	12	6	6
Spring Valley.....	2	2	17	15	2
Springfield.....	197	217	6,086	3,494	2,592
Sparta.....	8	8	27	8	19
Staunton.....	30	42	64	34	30
Steelville.....	2	2	26	24	2
Sterling.....	54	64	1,266	953	313
St. Francisville.....	14	14	42	17	25
Stockton.....	13	13	36	13	23
Streator.....	340	432	7,843	6,300	1,537
Sublette.....	1	1	3	2	1
Sullivan.....	17	17	64	29	35
Sycamore.....	73	90	667	456	211
Tamaroa.....	3	3	6	3	3
Tamms.....	3	3	49	45	4
Tampico.....	6	6	19	8	11
Taylorville.....	78	79	467	206	261
Tiskilwa.....	9	18	19	10	9
Tonica.....	3	3	8	5	3

TABLE NO. 2—Concluded.

City or town.	Number of establish- ments.	Number of inspec- tions.	Total.	Males.	Females.
Toulon.....	8	8	29	17	12
Tower Hill.....	7	7	22	9	13
Tuscola.....	28	28	86	31	55
Union.....	4	4	36	29	7
Urbana.....	29	29	398	309	89
Utica.....	25	29	134	107	27
Vermont.....	2	2	7	2	5
Vienna.....	7	7	21	8	13
Villa Grove.....	3	3	12	4	8
Warren.....	6	6	36	24	12
Warrensburg.....	1	1	161	126	35
Warsaw.....	11	16	233	154	79
Washburne.....	3	3	11	5	6
Washington.....	10	10	394	224	170
Waterloo.....	7	7	36	25	11
Watseka.....	12	12	64	27	37
Watterman.....	1	1	4	4	4
Waukegan.....	119	124	5,820	5,022	798
Waverly.....	13	19	26	13	13
Wedron.....	2	2	27	26	1
West Chicago.....	2	2	103	101	2
Whitehall.....	6	6	118	101	17
Wilmington.....	4	4	21	9	12
Winchester.....	29	47	63	34	29
Winslow.....	3	3	11	7	4
Withersfield.....	1	1	9	8	1
Witt.....	1	1	2	1	1
Woodstock.....	8	10	1,363	1,218	145
Wyandot.....	8	9	13	5	8
Wyoming.....	5	5	7	2	5
Yorkville.....	21	23	55	24	31
Ziegler.....	1	1	21	17	4
Zion City.....	10	12	370	172	198
Total.....	7,809	9,392	185,968	137,510	48,458

RESULTS OF INSPECTIONS ACCORDING TO THE PROVISIONS OF THE GARMENT LAW.

This law regulates the manufacture of clothing, wearing apparel and other articles and prohibits the manufacture of coats, vests, trousers, knee-pants, overalls, cloaks, skirts, ladies' waists, purses, feathers, artificial flowers, or cigars in any room used for eating or sleeping purposes in any tenement or dwelling house, except by the family of the tenant. Every workshop must be clean and sanitary and free from vermin and contagious matter. All firms sending work to home workshops must keep and furnish a list of the location of such home shops to the State Board of Health and to the State Factory Inspector.

The Board of Health or the Department of Factory Inspection must inspect these shops and if any contagious diseases are present all goods or materials in the workshop must be destroyed.

If goods or materials in a contaminated condition are transported to this State, the Board of Health must destroy it.

The terms, factory, workshop, and manufacturing establishments, are defined to mean any place where goods are made in whole or in part, or repaired, darned or sorted for sale or for wages. Places under this description are open to inspectors. A complete list of such home shops must be produced by the employer upon demand of the factory inspector.

The following table gives the number of establishments inspected according to the provisions of this law. The various establishments have been thrown into industrial classifications. The inspections necessary in the course of the year are presented with the number of employees for each industrial group.

The table presents 21 industries. Two thousand four hundred and thirty-one inspections were made in 1,540 establishments located in Cook County which employed a total of 53,522 persons.

The number of girls 14 to 16 years old employed in the 1,540 establishments is 778. Boys are evidently not desired or are less useful than girls, a comparison showing that 453 fewer boys than girls were employed.

TABLE NO. 1—INSPECTIONS ACCORDING TO AN ACT TO REGULATE THE MANUFACTURE OF CLOTHING, WEARING APPAREL AND OTHER ARTICLES—CHICAGO AND COOK COUNTY.

July 1, 1915, to June 30, 1916.

Industry.	Number of establishments.	Number of inspections.	Number of employees.				
			Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.
Artificial flowers.....	5	12	256	51	203	.....	2
Cigars.....	30	46	587	349	236	.....	2
Cleaners, etc.....	420	489	1,446	846	579	20	1
Clothing, men's.....	281	314	13,523	6,885	6,425	42	171
Clothing, men's coats.....	122	212	10,839	5,609	4,891	93	246
Clothing, trousers.....	72	131	4,648	1,601	2,923	31	94
Clothing, vests.....	49	96	3,574	1,408	2,079	36	51
Clothing, women's.....	18	32	4,296	1,532	2,747	12	7
Clothing, skirts.....	22	54	780	240	498	16	26
Clothing, cloaks.....	81	133	1,468	811	638	14	5
Clothing, dresses.....	12	43	4,541	1,548	2,965	15	43
Clothing, waists.....	10	31	559	172	365	13	9
Knee pants.....	18	52	396	151	233	1	11
Overalls.....	9	19	174	69	91	2	12
Men's furnishings.....	31	74	838	440	389	1	8
Women's furnishings.....	13	39	829	210	614	2	3
Corsets.....	3	12	1,848	423	1,408	8	14
Knit goods.....	13	43	674	93	570	3	8
Repairing.....	133	276	258	165	93	.....	.....
Hats and caps.....	17	44	989	355	604	14	16
Millinery.....	121	277	997	130	816	2	49
Total.....	1,540	2,431	53,522	23,088	29,331	325	778

Table No. 2 shows the inspections made in cities outside of Cook County. This is the second year in the history of the department that inspections under this law have been made outside of Chicago and Cook County.

TABLE NO. 2—INSPECTIONS UNDER GARMENT LAW—IN CITIES OUTSIDE OF COOK COUNTY.

July 1, 1915, to June 30, 1916.

Location.	Number of establishments inspected.	Number of inspections.	Number of employees.				
			Total.	Males over 16.	Females over 16.	Boys 14 to 16.	Girls 14 to 16.
Abingdon.....	1	1	3	3			
Aurora.....	4	5	242	56	178		8
Carthage.....	3	3	10	10			
Clayton.....	1	1	6	4	2		
Decatur.....	5	5	574	74	474	2	24
East St. Louis...	1	1	8	2	6		
Elgin.....	2	2	213	56	148		9
Freeport.....	3	3	205	32	173		
Galesburg.....	17	17	243	94	147	2	
Highland Park...	1	1	3	3			
Lake Forest.....	1	1	4	4			
Lacon.....	1	1	4	4			
Knoxville.....	3	3	11	4	7		
Kewanee.....	1	1	3	2	1		
Mendota.....	5	5	21	15	6		
Macomb.....	8	8	18	8	14		
North Chicago...	1	1	2	2			
Peoria.....	7	7	198	110	79		
Polo.....	1	1	5	1	4		
Rockford.....	5	5	731	411	307	5	8
Stockton.....	2	2	6	6			
Warsaw.....	1	1	5	5			
Waukegan.....	16	16	286	54	232		
Total.....	90	91	2,796	960	1,778	9	49
							58

RESULTS OF INSPECTIONS ACCORDING TO THE PROVISIONS OF THE "ICE CREAM AND BUTTERINE LAW."

PRINCIPAL FEATURES OF THE LAW.

Section 1 of the law demands that the drainage and plumbing of all buildings and rooms occupied by butterine and ice cream manufacturers shall be conducive to healthful and sanitary conditions and that adequate ventilation prevails. Particular mention is made of cellars and basements, in which strict observance of the above mentioned rules is required.

Section 2 of this law requires every room to be at least 8 feet in height and to have an impermeable floor of cement or tiles laid in cement or an additional flooring of wood saturated with linseed oil. The walls must be plastered and wainscoted. In the discretion of the factory inspector, the walls and ceilings may be required to be whitewashed or calcimined at least once in three months. The utensils must be cleaned and arranged in such order that any part of the room can be readily cleaned; the rooms must be dry and airy; no domestic animal is permitted in a room where the products are made or stored; and no water closets or ash pits shall be within or connected with such rooms.

Section 3 of this law directs that the Chief Factory Inspector issue a certificate to the owner of such manufactories if the conditions are satisfactory.

Section 4 of this law gives the factory inspector power to require alterations, if necessary, when a written notice must be served upon the

owner, agent or lessee of such premises either personally or by mail, such orders to be complied with 60 days after service. The penalty clause recites that a violator of these provisions is subject to a fine of not less than fifty dollars nor more than two hundred dollars for the first offense; for the second offense, he is subject to a fine of five hundred dollars or imprisonment for not more than thirty days; for the third offense, a fine of not less than five hundred dollars, or more than sixty days' imprisonment, or both, is imposed. This law became effective on the first day of July, 1907.

The appended table shows the number of establishments visited in various cities and towns and the number of inspections, the kind of business conducted, the nativity of the owner; location of factory rooms, number of certificates issued, and the kind of order for alterations or improvements issued by deputy inspectors to owners.

A total of 183 inspections of 183 establishments was made in 13 cities and towns during the past year. From the table it will be seen that 158 manufactories located in Cook County required a like number of inspections, whereas 25 establishments in the remaining 12 towns outside of Cook County called for 25 visits by the deputy factory inspectors.

In Cook County as well as in towns outside of Cook County the great majority of establishments manufacturing ice cream were of the small retail confectionery variety. A total of 148 of these stores is registered for the entire State, 135 being located in Cook County and 13 in the smaller cities and towns. Establishments manufacturing and retailing their own product numbered 4 in Cook County and 5 outside of Cook County, making a total of 9 for the entire State. A total of 10 exclusively wholesale manufactories is shown for the State, divided into two groups, 6 in Cook County and 4 outside of Cook County. Three drug stores, 4 restaurants and hotels, 4 bakeries and 5 caterers, mostly all located in Chicago, were found manufacturing ice cream for their own trade.

Of the 183 establishments reported on, 82 were under Greek ownership. The vast majority of Greek ownership is very apparent in Chicago, where the Greeks own more establishments than the other class of citizens combined. In cities and towns outside of Cook County, the majority of establishments are owned by American citizens. Shops conducted by Italians are more numerous than those under the control of American citizens in Cook County; of the 57 American owned places of business, 35 are located in Cook County, the remaining 22 in the twelve towns shown in the table. Greeks operate shops in Jacksonville and Springfield, whereas only one Italian owned shop is reported outside of Cook County. One hundred and thirteen ice cream manufacturing places are located in basements, 55 on the first floor and the remaining 15 on or above the second floor. Basement shops prevail in Chicago the actual number reported being 101, leaving only 12 basement shops in cities and towns outside of Cook County. On the other hand, all of the shops, with the exception of the 12 just mentioned and one on the second floor of a firm in Marshall, are situated on the ground floor in towns outside of Chicago.

A total of 177 certificates were issued, showing that conditions in these establishments were satisfactory. Six applications were refused.

Two hundred and seventy-eight orders were issued to remedy defective conditions. Six orders involved general cleanliness, ten orders for repair and installation of adequate drains and plumbing, seven orders for provisions of garbage receptacles, nine orders for the removal of water closets from work room, three orders for proper ventilation, two hundred and twenty-eight for calcimining walls and ceilings, eight orders for cementing or repairing floors, two orders for replacing defective utensils, two orders to properly guard dangerous machinery and five orders to provide screens on doors, windows and ventilators to prevent dirt from being blown into work room.

RESULTS OF INSPECTIONS ACCORDING TO THE ICE CREAM AND BUTTERINE
LAW FOR THE ENTIRE STATE.

July 1, 1915, to June 30, 1916.

City.	Number of establishments.	Number of inspections.	Nature of business.							Nativity of owner.			Location of factory room.		
			Wholesale.	Retail.	Retail confectionery.	Bakery.	Drug store.	Caterer.	Hotel and restaurant.	American.	Italian.	Greek.	Basement.	First floor.	Second floor and up.
Chicago and Cook County.....	158	158	6	4	135	2	3	4	4	35	41	82	101	43	14
Belleville.....	1	1				1				1				1	
Bloomington.....	1	1	1										1		
Bunker Hill.....	1	1			1									1	
Carlinville.....	2	2	1	1									1	1	
Carlyle.....	1	1				1	1							1	
Gillespie.....	1	1								1				1	
Jacksonville.....	3	3			3									1	
Kankakee.....	2	2		2						2		1	3		
Marshall.....	1	1				1								1	
Springfield.....	9	9		1	8		1			3		1	6	3	1
Staunton.....	1	1		1										1	
Viriden.....	2	2		1						1	1		1	1	
Total outside Cook County.....	25	25	4	5	13	3				23	1	2	13	12	1
Total entire State.....	183	183	10	9	148	2	3	4	4	57	42	84	113	55	15

RESULTS OF INSPECTIONS ACCORDING TO THE ICE CREAM AND BUTTERINE
LAW FOR THE ENTIRE STATE—Continued.

	Number of certificates.		Orders issued pertaining to—												
	Issued.	Refused.	Cleanliness.	Plumbing.	Garbage and receptacles.	Water closets.	Ventilation.	Walls.	Calceimining.	Cementing or repairing floor.	Animals.	Factory rooms for sleeping quarters.	Defective utensils.	Machinery.	Screens on doors, windows and ventilators.
Chicago and Cook County.....	152	6	1	10	2	7	1	102	102	8		1	2	1	4
Belleville.....	1							1	1						
Bloomington.....	1				1			1							
Bunker Hill.....	1					1		1							
Carlinville.....	2				1		1								
Carlyle.....	1							1	1						

**RESULTS OF INSPECTIONS ACCORDING TO THE ICE CREAM AND BUTTERINE
LAW FOR THE ENTIRE STATE—Concluded.**

	Number of certifi- cates.		Orders issued pertaining to—												
	Issued.	Refused.	Cleanliness.	Plumbing.	Garbage and receptacles.	Water closets.	Ventilation.	Calci- mining.		Cementing or repairing floor.	Animals.	Factory rooms for sleeping quarters.	Defective utensils.	Machinery.	Screens on doors, win- dows and ventilators.
								Walls.	Ceiling.						
Gillespie	1					1		2	2						
Jacksonville	3				1			1	1			1			1
Kankakee	2														
Marshall	1														
Springfield	9	1			2		1	4	4					1	
Staunton	1							1	1						
Virden	2														
Total outside Cook County	25		1		5	2	2	12	12			1		1	1
Total entire State.	177	6	2	10	7	9	3	114	114	8		2	2	2	5

RESULTS OF PROSECUTIONS—LEGAL DEPARTMENT.

The following tables show the work of prosecution of violators of the law:

Table No. 1 compares the results of the year just ended with those of the preceding year. During the past twelve months 496 convictions were secured, with fines and costs amounting to \$9,054.96. The number of convictions obtained in the Municipal Courts of Chicago is 220, the fines and costs amounting to \$4,199.60; while cases brought in courts outside of Chicago numbered 276, with fines and costs aggregating \$4,855.36.

Table No. 2 presents the cases by months brought before the Municipal Court of Chicago.

Table No. 3 offers a list of 54 towns in which our deputy inspectors prosecuted violators of the laws.

Table No. 4 shows the totals of the results of prosecutions for the City of Chicago, and the 54 towns outside of Chicago mentioned in Table No. 3.

TABLE NO. 1—COMPARATIVE TABLE OF RESULTS OF PROSECUTIONS.

July 1, 1915, to June 30, 1916, and July 1, 1914, to June 30, 1915.

Kind of law.	Year.	Number of cases.	Fines and costs.
City of Chicago—			
Child Labor Law	1915-1916	70	\$1,097 75
	1914-1915	82	1,122 20
Ten Hour Law	1915-1916	106	1,896 55
	1914-1915	166	2,315 25
Structural Law	1915-1916	14	496 50
	1914-1915	9	280 75
Occupational Disease Law	1915-1916	3	40 75
	1914-1915	3	47 50

TABLE NO. 1—Concluded.

Kind of law.	Year.	Number of cases.	Fines and costs.
City of Chicago—Concluded.			
Health, Safety and Comfort Law.....	1915-1916	25	\$613 30
	1914-1915	11	177 00
Ice Cream.....	1915-1916	1	58 75
	1914-1915	.....	.....
Wash House.....	1915-1916	1	6 00
Total for Chicago.....	1915-1916	220	\$4,199 60
	1914-1915	230	4,192 75
Outside of Chicago—			
Child Labor Law.....	1915-1916	132	\$1,484 76
	1914-1915	74	810 25
Ten Hour Law.....	1915-1916	117	1,684 55
	1914-1915	115	1,631 35
Health, Safety and Comfort Law.....	1915-1916	24	1,660 70
	1914-1915	6	117 40
Structural Law.....	1915-1916	1	29 75
	1914-1915	2	162 25
Wash House Law.....	1915-1916	2	15 60
	1914-1915	8	900 40
Total outside of Chicago.....	1915-1916	276	\$4,855 36
	1914-1915	205	2,921 65
Total for the entire state.....	1915-1916	496	\$9,054 96
	1914-1915	435	7,114 40

TABLE NO. 2—RESULTS OF PROSECUTION IN THE CITY OF CHICAGO.

July 1, 1915, to June 30, 1916.

Kind of violation.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Total.	Fines.	Costs.	Total fines and costs.
Child labor—																
Under 14 years of age.....	2	2		3	1	2	2					4	7	\$ 35 00	\$ 30 00	\$ 65 00
Without age and school certificate.....	2				1	2		1	1			2	19	246 00	167 00	413 00
Over 8 hours per day.....	2		1	2	2	1	21	2			2		31	205 00	178 00	383 00
Violation of section 11.....																
Before 7 a. m.—after 7 p. m.....		2	1	2							1		6	45 00	51 00	96 00
Obstruction.....							1	1					3	60 00	20 75	80 75
Over 48 hours per week.....					2	2							4	30 00	30 00	60 00
Women's Ten Hour Law—																
Over 10 hours per day.....	3	6	1	1	8	2	7	3	2	1	2	1	37	776 00	251 50	1,027 50
No time record.....	8	3	4	2	8	8	8	2	2	7	7	10	69	435 00	434 05	869 05
Structural Law.....		1		2	1		1	1		3	1	5	14	375 00	111 50	486 50
Garment Law.....																
Occupational Disease Law.....	3												3	30 00	10 75	40 75
Health, Safety and Comfort Law.....		2		2	7		2	4	1	2	3	2	25	400 00	213 30	613 30
Ice Cream.....	1												1	50 00	8 75	58 75
Wash House.....					1								1	5 00	1 00	6 00
Number of cases.....	19	16	7	15	29	15	40	14	6	13	22	24	230			\$4,199 60
Fines.....	\$185 00	\$203 00	\$17 00	\$173 00	\$310 00	\$131 00	\$506 00	\$235 00	\$170 00	\$205 00	\$191 00	\$307 00	\$2,692 00			
Costs.....	98 00	139 25	47 25	111 25	191 75	70 50	256 50	110 55	41 25	115 75	188 25	152 30	1,507 00			

TABLE NO. 3—RESULTS OF PROSECUTION OTHER THAN THE CITY OF CHICAGO.

July 1, 1915, to June 30, 1916.

City.	Total number of convictions.	Child labor law.									
		Over 8 hours.		Before 7 a. m. or after 7 p. m.		Violation of section 11.		Under 14 years.		Without age or school certificate.	
		Num-ber of cases.	Fines. Costs.	Num-ber of cases.	Fines. Costs.	Num-ber of cases.	Fines. Costs.	Num-ber of cases.	Fines. Costs.	Num-ber of cases.	Fines. Costs.
Abingdon.....	1	1	\$ 10 00	1	\$ 10 00	1	\$ 10 00	1	\$ 10 00	1	\$ 5 00
Alton.....	7	1	\$ 7 30	1	\$ 7 30	1	\$ 10 00	1	\$ 10 00	1	\$ 1 76
Aurora.....	43	1	\$ 7 30	1	\$ 7 30	1	\$ 10 00	1	\$ 10 00	1	\$ 5 00
Blue Island.....	5	1	\$ 7 30	1	\$ 7 30	1	\$ 10 00	1	\$ 10 00	1	\$ 5 00
Bloomington.....	19	2	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Canton.....	5	1	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Champaign.....	1	1	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Cherry.....	1	1	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Clifton.....	1	1	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Coffeen.....	2	1	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Collinsville.....	3	1	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Clyde.....	12	1	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Danville.....	1	1	10 00	1	10 00	1	10 00	1	10 00	1	10 00
Decatur.....	27	4	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Earville.....	14	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
East St. Louis.....	1	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Edwardsville.....	1	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Elgin.....	1	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Evansville.....	6	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Farina.....	1	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Forest Park.....	1	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Freeport.....	3	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Galesburg.....	7	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Genoa.....	2	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Georgetown.....	4	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Gillespie.....	2	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Granite City.....	2	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Harvel.....	2	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Harvey.....	4	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Herrin.....	4	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Hillsboro.....	1	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00
Jacksonville.....	4	1	20 00	1	20 00	1	20 00	1	20 00	1	20 00

TABLE NO. 3—Continued.

City.	Total number of convictions	Child labor law.															
		Over 8 hours.			Before 7 a. m. or after 7 p. m.		Violation of section 11-			Under 14 years.		Without age or school certificate.		Fines.	Costs.		
		Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.				
Joliet.....	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kewanee.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kolze.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
LaGrange.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
LaSalle.....	3	3	\$40 00	\$31 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maywood.....	6	2	10 00	10 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Murphysboro.....	3	1	5 00	7 15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Athens.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oak Park.....	9	1	5 00	4 10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pekin.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peoria.....	20	1	50 00	9 40	1	5 00	9 40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rockford.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shelbyville.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silvis.....	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springfield.....	12	3	15 00	12 30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sparta.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring Valley.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Streator.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tower Hill.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Woodstock.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnebago.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Waukegan.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	276	26	\$192 00	\$107 05	17	\$76 00	\$76 25	4	\$25 00	\$26 45	18	\$136 00	\$268 76	\$268 76	\$360 00	\$624 76	\$624 76

* Includes one conviction for false affidavit in Aurora, with fines and costs \$59.80.

† One conviction for false affidavit in Elgin, with fines and costs \$11.80.

TABLE NO. 3—Continued.

City.	Ten hour law.						Health, safety and comfort.			Structural law.			Wash house law.			Total.		
	Over ten hours.			No time record.			Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.	Fines.	Costs.	Fines and costs.
	Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.												
Abingdon.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	\$ 5 00	\$ 1 75	\$ 6 75
Alton.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80 00	50 00	130 00
Aurora.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70 00	24 45	94 45
Blue Island.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30 00	24 00	54 00
Bloomington.....	1	\$ 25 00	\$ 5 00	9	\$ 40 00	\$19 45	.....	.....	.....	.....	.....	.....	.....	.....	.....	118 00	204 80	322 80
Canton.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25 00	7 25	32 25
Champaign.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5 00	.....	5 00
Cherry.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5 00	7 00	12 00
Clifton.....	1	25 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25 00	25 95	50 95
Coffeen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 00	.....	10 00
Collinsville.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20 00	.....	20 00
Clyde.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Danville.....	1	5 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53 00	61 70	114 70
Decatur.....	4	60 00	12 80	5	30 00	4 80	.....	.....	.....	.....	.....	.....	.....	.....	.....	151 00	39 95	190 95
Earville.....	1	25 00	1 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25 00	1 50	26 50
East St. Louis.....	3	75 00	63 90	6	23 00	44 70	.....	.....	.....	.....	.....	.....	.....	.....	.....	137 00	154 65	291 65
Edwardsville.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 00	2 35	5 35
Elgin.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5 00	3 80	8 80
Evanson.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70 00	23 75	93 75
Farina.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25 00	1 50	26 50
Forest Park.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5 00	.....	5 00
Freeport.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15 00	3 75	18 75
Galesburg.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	42 15	47 90	90 05
Genoa.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100 00	3 00	103 00
Georgetown.....	4	100 00	8 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100 00	8 00	108 00
Gilesple.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 00	4 10	14 10
Granite City.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12 00	9 60	21 60
Harvel.....	1	25 00	7 95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30 00	15 90	45 90
Harvey.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8 00	15 75	23 75
Herrin.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 00	6 45	9 45
Hillsboro.....	1	75 00	5 85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75 00	5 85	80 85
Jacksonville.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	156 00	12 20	168 20
Joliet.....	1	25 00	4 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20 00	33 20	53 20
Kewanee.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5 00	2 20	7 20
Kolze.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 00	6 00	16 00
LaGrange.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20 00	30 00	50 00

TABLE NO. 3—Concluded.

City.	Ten hour law.						Health, safety and comfort.			Structural law.			Wash house law.			Total.		
	Over ten hours.			No time record.			Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.	Fines and costs.		
	Num-ber of cases.	Fines.	Costs.	Num-ber of cases.	Fines.	Costs.												
LaSalle.....	1	\$25 00	\$12 00	2	\$15 00	\$16 00										\$ 80 00	\$ 49 00	\$ 129 00
Maywood.....																	11 00	14 00
Murphysboro.....																	5 00	10 00
New Athens.....	1	25 00	1 15	2	6 00	2 30											7 15	13 15
Oak Park.....				4	18 00	17 00											31 00	3 45
Pekin.....				1	5 00	8 50	2	\$ 60 00	\$ 9 50								88 00	35 45
Peoria.....	1	25 00	8 30	1	5 00	8 30											5 00	95 60
Rockford.....				1	3 40												8 50	123 60
Shelbyville.....	1	25 00	12 45	3	3 00	18 75							1		\$2 00	215 00	150 10	365 10
Silvis.....																	30 00	395 10
Springfield.....				1	1 00	17 20	13	1,325 00	48 70								28 00	15 00
Sparta.....																	31 20	89 20
Spring Valley.....																	1,325 00	48 70
Streator.....	1	25 00	1 80	3	50 00	3 40											56 00	60 45
Tower Hill.....				1	10 00	1 85											6 00	116 45
Woodstock.....	1	25 00	4 60														60 00	34 70
Winnetka.....				1	3 00	4 75											75 00	5 20
Waukegan.....				2	10 00	10 00	2	60 00	25 10								10 00	1 85
																	25 00	4 60
																	3 00	7 75
																	80 00	44 65
Total.....	25	\$616 00	\$156 10	92	\$494 15	\$398 30	24	\$1,520 00	\$140 70	1	\$25 00	\$4 75	2	\$5 00	\$10 60	\$2,520 15	\$1,535 21	\$4,855 36

TABLE NO. 4—RESULTS OF PROSECUTIONS FOR THE ENTIRE STATE.

	In Chicago.	Outside of Chicago.	Total entire State.
Child Labor Law—			
Under 14 years of age—			
Number of cases	7	18	25
Fines	\$35 00	\$136 00	\$171 00
Costs	30 00	98 65	128 65
Over 8 hours per day—			
Number of cases	31	26	57
Fines	\$305 00	\$192 00	\$397 00
Costs	178 00	107 05	285 05
Before 7 a. m. or after 7 p. m.—			
Number of cases	6	17	23
Fines	\$45 00	\$76 00	\$121 00
Costs	51 00	76 25	127 25
Without age or school certificates—			
Number of cases	19	65	84
Fines	\$246 00	\$378 00	\$622 00
Costs	167 00	296 76	463 76
Over 48 hours per week—			
Number of cases	4		4
Fines	\$30 00		\$30 00
Costs	30 00		30 00
Obstruction—			
Number of cases	3		3
Fines	\$60 00		\$60 00
Costs	20 75		20 75
Violation section 11—			
Number of cases		4	4
Fines		\$25 00	\$25 00
Costs		26 45	26 45
Total—			
Number of cases	70	132	202
Fines	\$621 00	¹ \$360 00	\$1,481 00
Costs	476 75	² 624 76	1,101 51
Ten Hour Law—			
Over 10 hours—			
Number of cases	37	25	62
Fines	\$776 00	\$616 00	\$1,392 00
Costs	251 50	156 10	407 60
No time record—			
Number of cases	69	92	161
Fines	\$435 00	\$494 15	\$929 00
Costs	434 05	368 30	832 25
Total—			
Number of cases	106	117	223
Fines	\$1,211 00	\$1,110 15	\$2,321 15
Costs	685 55	554 40	1,239 95
Health, Safety and Comfort Law—			
Number of cases	25	24	49
Fines	\$400 00	\$1,520 00	\$1,920 00
Costs	213 30	140 70	354 00
Occupational Disease Law—			
Number of cases	3		3
Fines	\$30 00		\$30 00
Costs	10 75		10 75
Structural Law—			
Number of cases	14	1	15
Fines	\$375 00	\$25 00	\$400 00
Costs	111 50	4 75	116 25
Wash House Law—			
Number of cases	1	2	3
Fines	\$5 00	\$ 5 00	\$10 00
Costs	1 00	10 60	11 60
Ice Cream Law—			
Number of cases	1		1
Fines	\$50 00		\$50 00
Costs	8 75		8 75
Total of all Law—			
Number of cases	220	276	496
Fines	\$2,692 00	\$3,530 15	\$6,212 15
Costs	1,507 60	1,335 21	2,842 81
Total fines and costs	\$4,199 60	\$4,855 36	\$9,054 96

¹ Includes one conviction each in Aurora and Elgin for "False Affidavit," with fines of \$55.00.² Includes one conviction each in Aurora and Elgin for "False Affidavit," with costs of \$19.60.

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